

THE EFFECT OF NORMAL PERSONALITY,
PSYCHOPATHY AND ATTACHMENT ON ANTI- AND
PROSOCIAL OUTCOMES

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Thesis submitted to the University of Nottingham for the degree of
Doctor of Philosophy

September 2015

ABSTRACT

Psychopathy is a dangerous form of antisocial personality that is associated with aggressive and delinquent behaviour. This thesis investigated psychopathic traits in the normal population to assess the relationship to antisocial and prosocial behaviour. This was examined both psychometrically and behaviourally. Furthermore it was examined if emotion-processing deficits existed between individuals with high and low psychopathic traits in the normal population.

Study 1 examined if standard personality measures based on the Five-Factor Model (FFM) of Personality, as well as specific items aimed to index sub-clinical primary and secondary psychopathic traits, could predict psychopathy-related outcomes in 14 year olds. It was found that individuals with higher levels of Neuroticism (N) and lower levels of Conscientiousness (C) were at an increased risk of mental health problems. Higher levels of Extraversion (E) and lower levels of C were related to increased alcohol and drug use. Alcohol and drug use were also predicted by higher primary and secondary psychopathic-like traits.

Study 2 examined alcohol use as well as both proactive and reactive aggression in relation to FFM traits and psychopathic traits in adolescents, and revealed that psychopathic traits were the best predictors of aggression. Alcohol use was best predicted by FFM traits at age 14.

Study 3 was a replication of Study 2 using a young adult sample. Whereas alcohol use and proactive aggression were found to be best predicted by higher levels of psychopathic traits, as measured by the Youth Psychopathy Inventory, reactive aggression was most strongly predicted by high levels of N and low levels of Agreeableness (A).

As it has been suggested that attachment may be an underlying mechanism involved in the deficits seen in psychopathic individuals, in the second part of the thesis it was assessed whether attachment plays a role in the relationship between psychopathy and emotion-processing as well as antisocial and prosocial behaviour.

Study 4 confirmed psychometrically that psychopathy as measured by the YPI was related to attachment to parents as well as the dismissing-avoidant attachment style. Study 5 and 6 investigated the link between psychopathic traits and emotion-processing, prosocial and antisocial behaviour as well as the impact of attachment on these relationships. The results of these studies indicated that self-report psychopathy measures were related to antisocial outcomes psychometrically but failed to show predicted associations with prosocial and antisocial tendencies behaviourally. However, differences in emotion-processing were found between individuals with low and high levels of psychopathic traits. It was also found that FFM-based personality traits were useful in predicting psychopathy-related outcomes and can be effective in describing psychopathy-like traits.

Finally, self-reported attachment did not impact the relationship between psychopathy and emotion-processing, antisocial and prosocial behaviour.

These findings provide novel insight into the relationship between psychopathic traits and emotion-processing as well as antisocial and prosocial behaviour in the normal population, show the effectiveness of FFM traits in predicting psychopathy-related outcomes and highlight difficulties with regard to quantitative measures of attachment.

ACKNOWLEDGEMENTS

I would like to thank my examiners, Alan Pickering and Peter Chapman for their time and effort to make my viva an interesting and stimulating process.

Completing a PhD is not an easy task and I have been very lucky to have had great support throughout. A million thanks to my inspirational supervisor Claire Lawrence, who has been incredible; always enthusiastic about my work, always supportive and understanding. Also a big thank you to Eamonn Ferguson and Nadja Heym for their wisdom and advice. It was always welcome.

A huge thank you also to Lawrence Ma, David Heslip and Bandri Alotabi for taking their time to share their technical knowledge with me. Thank you to my amazing office mates Angie and Carla. I could not have asked for better people to share every day of the week with. I learned so much from you.

A big thank you also to all my friends and colleagues in the department who made my research adventure such a great, inspiring experience.

I also want to thank my family, Kate and Sarah for all their support. I am grateful to have you in my life and especially Martin, for being my greatest supporter, always cheering me on, for being there, listening to all my ideas and frustrations and giving me perspective.

Noah, thank you for being such a lovely boy. You made sure I always remembered that there was more than just my PhD.

Lastly, thank you to all the participants who took part in my research. I could not have done it without you.

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CHAPTER 1: INTRODUCTION

1.1. THESIS OVERVIEW

This thesis examines the extent to which psychopathy traits and normal personality traits can predict psychopathy relevant emotional, cognitive and behavioural outcomes in a non-clinical or forensic population. In doing so, there are three key questions this thesis addresses:

- (i) What is the relationship between self-report measures of psychopathy and psychopathy-related emotional, cognitive and behavioural outcomes in the normal population?
- (ii) Do more standard personality measures based on the Five-Factor Model (FFM) of personality predict these psychopathy-related outcomes?
- (iii) What role does attachment play in the relationship between psychopathy and emotion-processing as well as antisocial and prosocial behaviour?

To these ends, this introductory chapter will comprise three main sections. In the first, I will define psychopathy and describe its assessment and the impacts it has on both the individual and the community. In the second section, I will discuss normal personality, its relationship to psychopathy and how the examination of normal personality may enrich psychopathy research. In the third section, I will briefly outline two possible intervening variables in the link between psychopathy and its negative outcomes: emotion-processing and attachment.

As the studies in this thesis examine both adolescent (around 14 years of age) and young adult samples, I will also discuss briefly the importance of looking at these two groups and what this thesis offers in terms of the advances to the literature.

1.2. PSYCHOPATHY: A MULTIDIMENSIONAL CONSTRUCT

Psychopathy is a severe form of antisocial personality that is often associated with delinquent behaviour, a lack of remorse as well as a deviant and impulsive lifestyle (e.g. Hare, 1980, 2003). Psychopathy has been associated with aggression and among criminal offenders, those high in psychopathic traits tend to be more dangerous than those without psychopathic traits (Gretton, Hare, & Catchpole, 2004). Psychopaths commit more severe crimes, are more violent, cause more severe injuries to victims and are more likely to reoffend than offenders without psychopathic traits (Asscher et al., 2011; Gretton et al., 2004).

Furthermore, it has been found that psychopathy is a risk factor for the abuse of alcohol and drugs (e.g. Hillege, Das, & de Ruiter, 2010; Kimonis, Tatar, & Cauffman, 2012; Smith & Newman, 1990) as well as internalising and externalising mental health problems such as depression and conduct disorder, respectively (e.g. Wallinius, Nilsson, Hofvander, Anckarsäter, & Stålenheim, 2012). Therefore, furthering our understanding of the assessment, aetiology, and mechanisms of psychopathy is essential and will contribute to more beneficial, tailored interventions that aim to reduce antisocial and criminal behaviour and potentially allow early recognition and treatment.

Most approaches to psychopathy point to its multidimensional nature. The different aspects of psychopathy may have different sequelae and aetiologies and potentially different

associations with facets of normal personality. In order to understand the construct and structure of psychopathy, it is useful to examine the assessment tools that have been developed and refined over time to measure psychopathy.

1.2.1. The Psychopathy Checklist Revised

One of the most widely used and validated psychopathy measures is the Psychopathy Checklist-Revised (PCL-R: Hare, 1991, 2003). The PCL-R is a semi-structured interview that uses 20 items and institutional file data (e.g. criminal records) to assess the extent to which an individual demonstrates traits and behaviours that are associated with psychopathy. This means that the PCL-R is most often used in settings where such data are available, i.e. prisons, medium- to high-secure hospitals (see Brook et al., 2013).

The PCL-R is based on a two-factor structure, and a four-facet framework that uses a combined personality-based and a behaviour-based approach (see Table 1.1). Factor 1, or primary psychopathy, relates to personality-based traits. It is made up of two facets, *Interpersonal* characteristics that include manipulateness and grandiose sense of self, and the other facet, the *Affective* facet includes traits such as callousness, selfishness and a lack of remorse and empathy. Factor 2, or secondary psychopathy, comprises features based on both personality and behaviour. Secondary psychopathy is characterised by an impulsive and irresponsible lifestyle, the *Lifestyle* facet as well as poor behavioural control, early behaviour problems and delinquency, the *Antisocial* facet.

Psychopathy as measured by the PCL-R has been shown to predict a variety of antisocial and deviant behaviours such as violent recidivism, more severe violent offences (G. T. Harris & Rice, 1997), lower attendance and fewer positive outcomes in treatment programmes

(Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). The PCL-R also shows good convergent and discriminant validity (Hare, 2003).

Table 1.1 Two-factor, four-facet structure of psychopathy

Factor 1 (primary)	Factor 2 (secondary)
<i>Interpersonal</i>	<i>Lifestyle</i>
Glib/superficial	Stimulation seeking
Lying	Impulsive
Manipulative	Irresponsible
Grandiose self-worth	Parasitic
	Lack of realistic goals
<i>Affective</i>	<i>Antisocial</i>
Lack of remorse	Poor behavioural control
Shallow affect	Early behaviour problems
Callous	Juvenile delinquency
Fail to accept responsibility	Criminal versatility
	Revocation of conditional release

Although total PCL-R scores are not correlated with measures of anxiety, empathy and neuroticism (see Patrick, 2006), secondary psychopathy has been associated with greater trait anxiety (Benning, Patrick, Salekin, & Leistico, 2005). Due to the finding that secondary psychopathy is related to higher levels of anxiety, whereas primary psychopathy is unrelated to anxiety, researchers have used anxiety measures on psychopathy total scores in order to distinguish between primary and secondary psychopathic factors (e.g. Kimonis, Skeem, Cauffman, & Dmitrieva, 2011). This association between secondary psychopathy and trait anxiety is consistent with findings showing that individuals with secondary psychopathic traits are at an increased risk of developing internalising disorders related to anxiety, for

instance dependent or avoidant personality disorders (Skeem, Johansson, Andershed, Kerr, & Loudon, 2007), as well as alcohol and substance abuse (Hillege et al., 2010; Smith & Newman, 1990; Wallinius et al., 2012).

1.2.2. Alternative structures

There is an on-going debate about the factor structure of psychopathy and some argue that the construct of psychopathy should focus only on the intrinsic personality traits, *Interpersonal*, *Affective* and *Lifestyle* (e.g. Cooke, Michie, & Skeem, 2007). Cooke and colleagues argue that the fourth, *Antisocial* factor should not be part of the psychopathy assessment because antisocial behaviour is a consequence of psychopathic traits, rather than part of psychopathy itself (Cooke et al., 2007). In their analyses, Cooke and colleagues used data from over 1200 male offenders to compare the two-factor, three-factor and two-factor, four-facet models of psychopathy. The three-factor structure of psychopathy was found to have a better model fit than Hare's two-factor, four-facet structure. This three-factor structure, without an Antisocial facet has also been replicated in other samples such as youth samples (N=1024) (e.g. Andershed, Kerr, Stattin, & Levander, 2002).

In the psychopathy literature, researchers have made use of many different psychopathy measures, based on the two-factor, four-facet structure as well as the three-factor structure. In this thesis I will measure psychopathic traits based on the 3-factor structure due to the use of non-forensic samples in which delinquent behaviour may not be as prominent as in forensic settings. However, I will also often refer to and distinguish between primary and secondary psychopathic traits. This is because primary psychopathy relates to the *Interpersonal* and *Affective* (or Callous/Unemotional) factor and secondary psychopathy relates to the *Lifestyle* factor (Andershed, Hodgins, & Tengström, 2007). Distinguishing

between these aspects of psychopathy is meaningful because they are differentially linked to psychopathy-related outcomes (Kimonis, Frick, Cauffman, Goldweber, & Skeem, 2012; Skeem et al., 2007), methods of effective treatment and are important for diagnosis and risk assessment (Frick, 2009). Similarly, in the current thesis, I will make differential predictions about the link between primary and secondary psychopathy-type traits and a series of neuropsychological, behavioural and emotional outcomes.

1.3. PERSONALITY AND PSYCHOPATHY

Whereas measures such as the PCL-R are useful in clinical and forensic settings, these measures are not always easy or appropriate to implement in non-forensic settings, not least because institutional file data such as criminal records are either not existent or not available. Delinquent behaviour may not be as prominent and/or severe in community samples compared to forensic samples, and in younger samples, delinquent behaviour may not yet have emerged. As a result, measuring antisocial behaviour as a factor for emerging psychopathy traits may be less effective. As an alternative, measuring psychopathic traits based on the three-factor structure whereby antisocial behaviours are not taken into account can therefore provide a useful measure of psychopathy in young, community-based samples.

Importantly, while emphasis on antisocial behaviour in young community samples may restrict the usefulness of some measures of psychopathy, it has been suggested that psychopathic traits are not only evident in criminal populations but also within the normal¹

¹ The terms 'normal' population and 'normal' personality traits are used here not to imply abnormality in other samples, rather to distinguish samples and traits that are not clinically or forensically focused. As the samples in the thesis are predominantly from University and

population (e.g. Cleckley, 1976; Lynam & Derefinko, 2006). Investigating psychopathic traits in the normal population is useful as it allows insight into the adaptiveness of these traits within a non-forensic context.

In terms of community-based psychopathy assessments, a number of psychopathy measures have been developed. These are downward extensions of the PCL-R which have been well established and validated (e.g. Youth Psychopathy Inventory: Andershed et al., 2002; Self-Report Psychopathy Scale: Hare, 1985; Psychopathic Personality Inventory: Lilienfeld & Widows, 2005). For instance, the Psychopathic Personality Inventory (PPI) measures three psychopathic factors: Fearless Dominance (FD) which is associated with primary psychopathic traits, Impulsive Antisociality (IA) which is related to secondary psychopathy and Coldheartedness (CH) which is related to lack of empathy and emotion (Benning et al., 2005).

These psychopathy measures rely on self-report. This is beneficial as it removes the need for trained assessors to evaluate responses in PCL-type interviews and case note interrogation. This means the self-report measures are cheap and easy to administer to large numbers of individuals. However, the use of self-report also means we have to rely on participants' honesty in answering the questions. This can be problematic either because of impression management or lack of insight. While this is a problem for most self-report measures, this could be a more pressing issue with measures of psychopathy, as the very constructs being assessed are related to lying, manipulating others, and carelessness. Therefore participants higher in psychopathic traits may be more disposed to respond dishonestly, or carelessly,

school samples, 'community sample' would be a misleading term. Therefore the term 'normal' used throughout the thesis refers to non-forensic and non-clinical instruments or samples.

resulting in missing data. With this in mind, researchers have developed their assessment questions in a way that make traits such as unemotionality that often sound negative sound less undesirable (e.g. “I don’t let my feelings affect me as much as other people’s feelings seem to affect them.”), aiming to reduce impression management and manipulation biases at least.

In order to justify using psychopathy measures for the use in the normal population, it is however a necessary prerequisite that psychopathy *is* measurable within this non-forensic population. Specifically, if psychopathy is a dimensional construct, i.e. an extreme variant of normal personality, then research in non-forensic populations is possible and would in fact be beneficial for the study of psychopathy. If psychopathy is a taxonic construct, however, then it will not be possible to meaningfully measure psychopathic traits in non-forensic or non-clinical settings as very few people would be classified as having psychopathic traits. This will be discussed in the next section.

1.3.1. Psychopathy as a dimensional construct

An important and ongoing debate surrounding psychopathy is the question of whether the construct identifies a distinct group of individuals that differs from the normal population or whether in fact psychopathy is a dimensional disorder. This debate is significant for the research presented here because only if psychopathy is dimensional is it justifiable to investigate psychopathy-related traits in typically developing adolescents and university students (Edens, Marcus, Lilienfeld, & Poythress, 2006).

An early paper by Harris, Rice and Quinsey (1994) addressed this question by examining 653 men from a maximum security psychiatric institution. Psychopathic traits were assessed via the PCL-R. Using taxometric analyses they concluded that the construct of psychopathy was

not dimensional but rather a disorder that was classifiable. However, such a taxonic structure was only found for Factor 2 of psychopathy – the antisocial lifestyle. For the affective, interpersonal Factor 1, a taxonic structure was not found. Importantly, a number of issues regarding Harris' study were raised by Edens and colleagues (2006). For instance Edens argued that the sample used in Harris et al.'s (1994) study was potentially unrepresentative, the PCL-R scores were taken solely from file data without the additional inclusion of interviews as is typically the case (Edens, Marcus, Lilienfeld, & Poythress, 2006). It is therefore questionable if those findings reliably point to a taxonic nature of psychopathy. Nonetheless, a taxonic structure was also suggested by Skilling, Quinsey and Craig (2001) who analysed psychopathy data of over 1000 boys.

Harris et al.'s (1994) and Skilling et al.'s (2001) studies have, however, been criticised. Edens et al. (2006) attempted to replicate and improve Harris et al.'s (1994) study by using a more representative sample that consisted of male offenders from state prisons and men that were court-ordered to drug treatment institutions across different states in America (N=876). Furthermore, they measured psychopathic traits with the PCL-R and included both file review data as well as interview information. Conversely to Harris et al.'s (1994) findings, their results indicated that both Factor 1 and 2 of psychopathy were dimensional and not, as was found earlier, taxonic.

Furthermore Murrie et al. (2007), like Skilling et al (2001), used the PCL: Youth Version (PCL:YV: Forth, Kosson, & Hare, 2003) to measure psychopathic traits in young adolescents (N=757). They found psychopathy to be continuous. Compared to Murrie et al.'s (2007) study in which the taxometric analyses were performed at the scale level, in Skilling et al.'s (2001) study, the analyses were computed on only 8 PCL:YV items. These were the most

highly correlated items with the PCL:YV total score. This strategy potentially lacks important information from other items of the psychopathy measure that is necessary to capture the true psychopathy score which, in turn, determines if the construct is a taxon or not. In addition, Skilling et al. (2001) only used self-report data to assess psychopathic traits rather than both file data and interview data as were used in Murrie et al.'s (2007) study. This demonstrates that Murrie et al.'s (2007) study comprised a much broader pool of information about the sample in aiding the identification of the underlying structure of the psychopathy construct.

These more recent findings are also in line with research using a different measure of psychopathy, the Psychopathic Personality Inventory (PPI: Lilienfeld & Andrews, 1996). Marcus and colleagues used a sample consisting of 309 incarcerated male offenders and also concluded that psychopathy was dimensional (Marcus, John, & Edens, 2004).

Although earlier findings on the taxonic nature of psychopathy suggested that the construct is not dimensional, given the limitations found in these studies and more recent data, psychopathy is more likely a constellation of traits that lie at the extreme end of the personality continuum rather than representing a discrete category. For this reason, we argue that it is justifiable to use normal population samples to investigate psychopathy, and will therefore do so throughout the thesis.

The idea that personality disorders such as psychopathy can be investigated in the normal population and can be understood as extreme variants of normal personality has been integrated more functionally within the most recent Diagnostic and Statistical Manual for mental disorders (DSM-V: American Psychiatric Association, 2013), especially for the diagnosis of personality disorders (Widiger & Mullins-Sweatt, 2009). This integration took

place because diagnosing personality disorders (PDs) based on previous DSM frameworks had been challenging. Traditionally, there has been large heterogeneity within PD diagnoses, difficulty in determining meaningful thresholds for classifying disorders and a lack of fit between the categorical approach and the nature of the different personality disorders (Clark, 2007; Trull & Durrett, 2005; Widiger & Trull, 2007). Therefore, using the dimensional personality approach is useful for a more effective description of the different personality disorders (Widiger & Mullins-Sweatt, 2009).

1.3.2. The Five factor model of personality and psychopathy

As mentioned earlier, most of the measures used to identify psychopathic traits focus on a personality-based and a behaviour-based approach. Whereas the personality-based criteria include traits such as callousness, fearlessness or dishonesty, the behaviour-based characteristics comprise antisocial and criminal behaviours (Lilienfeld & Andrews, 1996). However, not all individuals with psychopathic traits necessarily engage in criminal acts. Consequently, focusing too heavily on the behavioural-based approach could result in an under-reporting of psychopathy. Measures of psychopathy based on personality models such as the Five-Factor Model (FFM) of personality (Costa & McCrae, 1992a) may be a promising alternative to clinical measures of psychopathy. The FFM of personality has been used extensively to measure normal personality across a wide variety of populations. It is a broadly robust and reliable measure (Costa & McCrae, 1992b). The FFM traits consist of Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C) and will be discussed in more detail in the following chapters. In brief, N is associated with characteristics such as worrying and insecurity. Individuals with higher levels of E are more outgoing and excitable than individuals with lower levels of E. O is associated with

curiosity and creativity, among other things. Lastly, higher levels of A and C are related to cooperative, trusting as well as organised and dependable personalities, respectively.

There have been a number of studies that showed that normal personality traits such as the FFM are related to the construct of psychopathy (e.g. Miller, Lynam, Widiger, & Leukefeld, 2001; Witt, Donnellan, Blonigen, Krueger, & Conger, 2009). This means that psychopathy may be understood more comprehensively in the context of a continuum from normal to extreme personality constructs and, as such, it is possible to examine the relationship between psychopathy and other personality disorders (Miller et al., 2001).

Using the 120-item NEO-Personality Inventory-Revised (NEO-PI-R, Costa & McCrae, 1992) to assess the FFM, primary psychopathy has been associated with low Neuroticism (N), Agreeableness (A), Conscientiousness (C) and high Extraversion (E) and Openness (O) (e.g. Miller & Lynam, 2003; Ross, Benning, Patrick, Thompson, & Thurston, 2009). Miller and Lynam (2003) suggested that the pattern of low N and high E might form a protection against internalising problems. In a subsequent study by Benning and colleagues, primary psychopathic traits were indeed found to be negatively correlated with internalising disorders (Benning et al., 2005).

Secondary psychopathy was found to be associated with high N and low C and A, (e.g. Ross et al., 2009; Witt, Donnellan, Blonigen, Krueger, & Conger, 2009). This evidence suggests that using standard personality traits based on the FFM of personality are related to the construct of psychopathy and even distinguish between primary and secondary psychopathic variants (e.g. Lilienfeld & Andrews, 1996; Roose et al., 2012). It enables a closer examination of the relationship between psychopathy, normal personality and other personality disorders (Miller et al., 2001). It also means that it is possible to identify these

psychopathy-like traits, at least to some extent, in non-forensic and non-clinical communities and therefore expand the settings in which psychopathic traits can be investigated.

1.3.4. Using the FFM as an alternative measure of psychopathy

Some research has taken a step further and used existing FFM-based measures to extract items capable of indexing psychopathy-like traits related to the PPI-R factors Fearless Dominance and Impulsive Antisociality (e.g. Witt, Brent Donnellan, & Blonigen, 2009). Using this method means that psychopathy-like traits could be assessed, for instance, in large databases where psychopathy measures have not been included. Additionally, the PPI-R contains 154 items to measure psychopathic traits whereas Witt's scale, based on the NEO-PI-R, contains 17 items for each factor. Therefore using this FFM-based psychopathy index could be more practical for some experimental set-ups, and less onerous for participants in large-scale 'big data' research. This is useful also because measures of psychopathy are not typically used in pre-existing broad population-based research, even those examining antisocial and impulsive behaviours (e.g. the IMAGEN study, Schumann et al., 2010; Saguenay Youth Study, Pausova et al., 2007). However, the ability to identify psychopathy-like traits in these large samples in the normal population could enable research to examine aspects such as the emotional, cognitive neuropsychological processes of typically developing individuals with and without psychopathy-related traits.

Witt et al's (2009) measure was based on the NEO-PI-R – a 120-item measure of the FFM. However, not all studies use the NEO-PI-R to assess personality (e.g. IMAGEN project: Schumann et al., 2010) but instead use the shorter version: the NEO-Five-Factor Inventory (NEO-FFI: McCrae & Costa, 2004). Therefore, Heym and Schwartz et al. used Witt's approach to develop a psychopathy index based on the NEO-FFI, named the Primary and Secondary

Psychopathy Traits scale (PSPT: Heym et al, submitted) to measure and identify primary and secondary psychopathy-like traits in a non-forensic and non-clinical population using a short instrument version of the FFM.

This thesis will use the FFM-based personality measures (NEO-FFI and PSPT) to index psychopathic-like traits. In Chapter 2, we will assess how effectively these measures predict mental health problems as well as alcohol and drug use in adolescents from an ongoing longitudinal European project: the IMAGEN project. This project investigates the genetic and neurobiological underpinnings of risk-taking behaviour, reinforcement sensitivity as well as psychiatric disorders. However, since the IMAGEN project does not include a measure of psychopathic traits, Chapter 3 will extend the findings from Chapter 2 by comparing the effectiveness of the personality-based psychopathy indexes to a validated psychopathy measure in predicting psychopathy-related outcomes both in adolescents and young adults.

1.3.5. Psychoticism and Psychopathy

An alternative approach to normal personality: Eysenck's Psychoticism, Introversion-Extraversion and Neuroticism (PEN) has also been used to study the construct of psychopathy. Psychoticism (P) has been found to be related to psychopathy (Eysenck, 1992) and is characterised by unemotional and impersonal characteristics as well antisocial tendencies (Eysenck, 1992). This existing work examining the role of P and psychopathy-related outcomes and processes has shown that those high in P demonstrate some similar physiological and trait associations as those scoring higher in measures of psychopathy in normal populations (Heym, Ferguson, & Lawrence, 2013; Heym & Lawrence, 2010). As this work has already been conducted, the current thesis aims to add to this literature by examining the role of the FFM traits. Furthermore, a meta-analysis that examined Eysenck's

PEN and the FFM traits in relation to psychopathy found that although the FFM traits A and C and Eysenck's P were significantly related to psychopathy, A and C showed larger effect sizes (-.52, -.38, respectively) than Eysenck's P (.25) (Lynam & Derefinko, 2006). This suggests that A and C are related to psychopathy above and beyond P. Indeed, some work has demonstrated that low A has been associated with primary psychopathy, while low C is associated with secondary psychopathy (Jakobwitz & Egan, 2006). As a result, using the FFM of personality allows such distinctions to be made.

1.4. PSYCHOPATHY AND EMOTION-PROCESSING

Negative behavioural outcomes associated with psychopathy have been related to a number of abnormalities including stimulus-reinforcement learning (Blair, 2010), on the psychophysiological level with reduced startle reflex (Patrick, Bradley, & Lang, 1993) and on the neurological level with amygdala abnormalities amongst other things (e.g. see Blair 2006).

All of the above can be linked to the emotion-processing impairments found amongst psychopathic individuals. Emotion-processing deficits in psychopathy have been researched extensively and have been found in behavioural studies using visual and vocal affect recognition tasks (e.g. Blair et al., 2002; Blair, Colledge, Murray, & Mitchell, 2001; Habel, Kuehn, Salloum, Devos, & Schneider, 2002), psychophysiological studies (e.g. Patrick et al., 1993; Verona, Patrick, Curtin, Bradley, & Lang, 2004) as well as neuroimaging studies (e.g. Decety, Skelly, & Kiehl, 2013; Larson et al., 2013).

Emotion-processing deficits have a number of important implications. It has been argued that understanding other people's emotions is important for the development of morals and

conscience which is maladapted in psychopathic individuals (Blair, 2005). Furthermore, Blair argued that lacking the ability to identify signals of distress in others such as fear and sadness interferes with neural systems that inhibit violent behaviour. It is therefore possible that these emotion-processing deficits, at least to some extent, are responsible for the severe aggressive behaviour displayed by psychopathic individuals, especially in forensic settings (Gretton et al., 2004).

A number of meta-analyses and reviews have examined the nature of emotion-processing deficits in psychopathic individuals (Brook et al., 2013; Dawel, O’Kearney, McKone, & Palermo, 2012; Marsh & Blair, 2008). Blair and colleagues concluded that psychopathy was associated with specific impairments for fearful and/or sad facial expressions (Blair, 2003; Marsh & Blair, 2008). However, other evidence points to rather mixed findings in the literature, with some studies showing a general emotion-processing deficit (e.g. Dolan & Fullam, 2006; Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009; Dawel et al., 2012).

It has been argued that these emotion-processing deficits may be due to attentional difficulties (Baskin-Sommers, Curtin, & Newman, 2013) that may be specific to the eye region of faces (Dadds, El Masry, Wimalaweera, & Guastella, 2008). Because the eyes hold salient cues for recognising facial expressions of fear and sadness (Eisenbarth & Alpers, 2011; Hernandez et al., 2009), it may not be surprising that individuals with psychopathic traits have difficulties identifying these expressions.

Therefore this thesis will focus on emotion-processing in relation to psychopathy and normal personality traits related to psychopathy. Chapter 5 and 6 will investigate emotion-processing deficits in individuals with higher and lower psychopathic traits. In Chapter 5, eye

movements will also be recorded during the emotion-processing task in order to examine if attention plays a role in the deficits seen in psychopathic individuals.

1.5. ATTACHMENT AND PSYCHOPATHY

This thesis also examines whether attachment to parents may have an intervening role in the link between psychopathy-related traits and negative behavioural outcomes such as aggression or alcohol and drug use, or be involved in the psychopathy-related emotion-processing deficits. The Theory of Attachment proposes that forming a close bond with an attachment figure in infancy is essential to ensure protection and nurturance (Bowlby, 1982). This bond allows the infant to explore the surroundings from a secure base, and in distressing situations the child will find comfort from the attachment figure. This secure base and secure bond occur when the attachment figure is responsive and sensitive to the child's physical and emotional needs. Consequently, attachment is thought to impact the development of coping strategies, emotion regulation and empathy (Bowlby, 1982).

However, not all attachment bonds are secure.

Whereas research has shown a link between secure attachment and lower levels of aggression as well as higher levels of empathy and positive affect, insecure attachment is related to more aggressive behaviour and less empathic tendencies (Thompson & Gullone, 2008). Therefore attachment that is insecure may give rise to problem behaviours such as antisocial tendencies. This has been supported by a number of studies (e.g. Craig, Gray, & Snowden, 2013; Dadds, Jambrak, Pasalich, Hawes, & Brennan, 2011). Furthermore, insecurely attached individuals have been found to process emotion differently from securely attached individuals. Since psychopathy is associated with higher antisocial tendencies, lower empathy and impaired emotion-processing, it is possible that attachment

is one of the mechanisms underlying psychopathy. However, research in this area is inconclusive and studies so far have not examined the impact of attachment on the relationship between psychopathy and emotion-processing.

To this end, the second part of this thesis will investigate the link between psychopathy, normal personality traits and attachment (Chapter 4) and then examine whether attachment influences the relationship between psychopathic traits and emotion processing (Chapters 5 and 6) as well as prosocial (Chapter 5) and antisocial behaviour (Chapter 6). This research will show whether early developmental factors, i.e. attachment to parents, pose a risk or protection from emotion-processing impairments and could potentially be integrated into intervention programmes for antisocial youth.

1.6. PSYCHOPATHY IN ADOLESCENCE

In this thesis, psychopathic traits will be examined in samples of young adults as well as adolescents. Some researchers believe that psychopathic traits already exist and are measurable prior to adulthood (e.g. Salekin & Lynam, 2010). Early identification of such traits may have implications for interventions as well as for furthering the understanding of their trajectory (Andershed, Hodgins, & Tengstrom, 2007; Frick, 2009). For instance, studies investigating psychopathy in youth samples found similar behaviour patterns between adult psychopaths and children whose parents and teachers rated them as having psychopathic traits. These behaviour patterns included antisocial behaviour, externalising behaviour problems and passive avoidance learning (Frick, O'Brien, Wootton, & McBurnett, 1994; Lynam, 1997). Other research looked at the importance of callous/unemotional (CU) traits in youths. It has been suggested that amongst youths with conduct problems and antisocial tendencies, the presence of CU traits defines a subgroup with more severe behaviour closely

linked to psychopathic tendencies (Frick, 2009). Furthermore, Frick showed that CU traits had a high stability in youth and predicted early onset Conduct Disorder as well as psychopathic tendencies in adulthood. This thesis will examine whether there are some personality traits that are related to the construct of psychopathy that can already be identified in adolescence, as more research is needed in this area. The early identification of psychopathic traits will further our understanding of the disorder's developmental stages, potential risk factors and life outcomes and inform research about the disorder's stability over time. This may also positively affect treatment plans.

Opponents of the view that psychopathic traits can already be assessed in youth argue however, that labelling adolescents as psychopaths may have negative consequences in the face of the law. One reason is that psychopathy is a disorder with specific and relatively *stable* personality traits. If a defendant is an adolescent still in the continuous process of developing his/her personality, a label of psychopathy may be misleading and difficult to oppose (Steinberg & Scott, 2003). Another problem with adolescent psychopathy is that some traits associated with psychopathy, such as impulsivity could be considered to be normative traits in adolescence and in most cases will diminish over time (Kotler & McMahon, 2005; Seagrave & Grisso, 2002). Therefore, it may prove difficult to correctly identify traits in youth that are uniquely associated with psychopathy and could cause potential mislabelling of children who do not have psychopathic traits.

These issues should be considered when investigating psychopathy-like traits in younger samples. However, it is beneficial to investigate the construct of psychopathy in youth more closely, use appropriate measures that can be used for children and adolescents and examine the stability of psychopathic traits throughout adolescence into adulthood.

1.7. SUMMARY

This thesis will address three main questions.

- (i) What is the relationship between self-report measures of psychopathy and psychopathy-related emotional, cognitive and behavioural outcomes in the normal population?
- (ii) Do more standard personality measures based on the Five-Factor Model (FFM) of personality predict these psychopathy-related outcomes?
- (iii) What role does attachment play in the relationship between psychopathy and emotion-processing as well as antisocial and prosocial behaviour?

In order to address these questions Study 1 (Chapter 2) will examine the effectiveness of FFM-based personality measures to predict alcohol and drug use as well as mental health problems related to psychopathy using adolescent data from the European longitudinal study; the IMAGEN project. Due to the absence of psychopathy measures within the IMAGEN project, Study 2 and Study 3 (Chapter 3) will, in addition to FFM-based measures, include a psychopathy measure to examine the effectiveness of the FFM-based measures and the psychopathy measure in predicting alcohol use and aggression in adolescents (Study 2) and also move on to addressing these links in young adults (Study 3).

As it has been suggested in the literature that attachment may in part be involved in the emotion-processing deficits seen in individuals with psychopathic traits it is necessary to first establish whether a link exists between attachment and psychopathic traits in the normal population. This will be the aim of Study 4 (Chapter 4). With this link established, Study 5 and Study 6 (Chapter 5 and 6) will investigate the link between psychopathic traits as well as FFM-based personality measures related to psychopathy and emotion-processing. The

impact of different attachment measures on emotion-processing will be examined in these studies. Furthermore, Study 5 will examine attention on the emotion-processing task as well as investigate the link between psychopathic traits, attachment and prosocial behaviour. Study 6 will include a behavioural measure of antisocial tendencies to examine if the link between self-reported psychopathic traits and behavioural indices of psychopathy can be observed.

CHAPTER 2: THE EFFECT OF THE FIVE-FACTOR MODEL PERSONALITY TRAITS ON PSYCHOPATHOLOGIES IN ADOLESCENCE

2.1. CHAPTER OVERVIEW

Research has shown that standard personality traits based on the Five-Factor Model (FFM) of personality are linked to psychopathy and may provide a useful description of the construct as well as indicate links to psychopathy-related outcomes (Lilienfeld & Andrews, 1996; Miller et al., 2001; Widiger & Mullins-Sweatt, 2009).

This chapter will investigate the extent to which the FFM of personality is associated with psychopathy-related outcomes in a large sample of adolescents. It will examine how the FFM traits predict (i) psychiatric diagnoses in general, (ii) internalising and externalising disorders specifically, and (iii) alcohol and drug use. It will also examine whether using specific combinations of FFM items that are thought to index primary and secondary psychopathic-like traits enables a greater or lesser prediction of these outcomes than the standard FFM traits.

2.1.1. Psychopathy measures based on the Five-Factor Model of personality

Psychopathic traits are often measured using scales specifically developed to tap into the construct of Psychopathy, such as the Psychopathy Checklist-revised (PCL-R: Hare, Hart, & Harpur, 1991). However, as mentioned in Chapter 1, there is growing evidence that psychopathy is also related to FFM personality traits (e.g. Lilienfeld & Andrews, 1996; Roose et al., 2012). This is useful because it provides researchers with a more comprehensive description of psychopathy and its relationship to other psychopathologies and personality

disorders (Miller et al., 2001). Furthermore, psychopathy-related traits can also be measured more appropriately in non-forensic settings.

Commonly it is found that Factor 1 of psychopathy, or primary psychopathy, is related to high Extraversion (E) and low Neuroticism (N) as well as low Agreeableness (A) (Witt, Donnellan, et al., 2009). In terms of Conscientiousness (C) and Openness (O) and the link to Factor 1 findings are somewhat mixed. Some find no associations between these FFM traits and primary psychopathy (Lynam et al., 2011) whereas other studies showed negative links with the sub-facet of O, *Openness to feelings*, as well as positive associations with C (Roose et al., 2012).

For Factor 2, or secondary psychopathy, negative associations with C and A, as well as a positive association with N have been found (Skeem et al., 2007; Skeem, Miller, Mulvey, Tiemann, & Monahan, 2005). The same authors did not find associations between secondary psychopathy and E.

Roose and colleagues (2012) examined the relationship between the FFM personality traits and psychopathy using the Youth Psychopathy Inventory (YPI: Andershed, Kerr, Stattin & Levander, 2002) factors in adolescents: The *Interpersonal* and *Callous/Unemotional (CU)* Factors, which map onto primary psychopathy and the *Lifestyle* Factor, which maps onto secondary psychopathy. In Roose's community sample of adolescent males (age range 15-20) they found somewhat different results to what has been found in the adult literature. The *CU (Primary)* Factor was negatively related to O and A, but also negatively related to E. The *Interpersonal (Primary)* Factor was *positively* related to O and C and the *Lifestyle (Secondary)* factor was *positively* associated with E and negatively with C.

In summary, O was differentially associated with the two primary-type factors (*CU* and *Interpersonal*) whereas in adults, the associations of Factor 1 and O are inconsistent – perhaps because of conceptual differences within Primary Psychopathy which have been distinguished in the YPI three-factor model of psychopathy. Although low A was a strong predictor of psychopathy in adults, within Roose’s study, low A was only associated with the *CU* factor. C was negatively associated with the *Lifestyle* factor which is consistent with the adult literature. Lastly, E was positively associated with *Lifestyle*, contrary to findings in the adult population (Skeem et al., 2005).

Using the NEO-Personality Inventory-Revised (NEO-PI-R: Costa & McCrae, 1992b) based on the FFM of personality, Witt and colleagues (2009) developed measures associated with psychopathic traits (*Fearless Dominance* associated with Primary Psychopathy, and *Impulsive Antisociality* associated with Secondary Psychopathy). They showed that psychopathic traits were associated with low A and C in students. On the same line, Heym and Schwartz developed the Primary and Secondary Psychopathic Traits (PSPT) scale (Heym et al., submitted), based on the shorter 60-item NEO-Five Factor Inventory (NEO-FFI) items. The PSPT scale aims to index sub-clinical primary and secondary psychopathic traits and comprises a total of 33 items; 21 items indexing primary psychopathic traits, and 12 items indexing secondary psychopathic traits. The scales showed moderate to good internal consistency (Cronbach’s $\alpha=.65$, and Cronbach’s $\alpha=.78$, respectively) but more research is necessary to understand this scale’s scientific value in identifying psychopathic-like traits. It would therefore be informative to examine the extent to which this proxy measure of psychopathy predicts psychopathy-related outcomes, namely psychopathologies in general and specifically internalising and externalising disorders as well as alcohol and drug taking behaviour. The established and expected links between psychopathic traits and mental (ill)

health will be discussed in order to derive hypotheses regarding the relationships between the FFM traits, PSPT factors and mental health outcomes.

2.1.2. Psychopathic traits and mental health

The psychopathy literature demonstrates a strong association with use and abuse of alcohol and drugs (Hillege et al., 2010; Kimonis, Tatar, et al., 2012; Smith & Newman, 1990) as well as mental health problems (Wallinius et al., 2012). As was discussed in Chapter 1 (section 1.2) primary and secondary psychopathy are differentially related to mental health, drug and alcohol abuse which may be due to the fact that individuals with primary psychopathic traits have low levels of anxiety (low N). Especially internalising mental health problems such as depression and anxiety-related disorders as well as alcohol abuse are linked to high levels of anxiety (high N) (e.g. Ayer et al., 2011; Lahey, 2009).

Therefore primary psychopathy seems to be a protective factor against internalising disorders (Lynam, 1997; Skeem et al., 2007) and alcohol and drug misuse (Smith & Newman, 1990). However, secondary psychopathic traits seem to increase the risk of such problems (Kimonis, Tatar, et al., 2012; Skeem et al., 2007). Smith and Newman found a significant relationship between Factor 2 of psychopathy and substance abuse but no association between Factor 1 and alcohol and drug abuse in a sample of prisoners (Smith & Newman, 1990). This evidence suggests that primary and secondary psychopathy are constructs that have different trajectories, leading to different mental health outcomes. The extent to which the FFM traits of personality, and more specifically the PSPT scales, could be used to mirror these associations is now examined.

2.1.3. Five-Factor Model of personality and mental health

Standard personality traits based on the Five-Factor Model of Personality (Costa & McCrae, 1992c; McCrae & Costa, 2004) are differentially related to mental health and alcohol and drug use. The FFM traits may offer insight into ways to tailor interventions for those with mental health problems. The associations between FFM traits and mental health are specified below.

Neuroticism: N is associated with vulnerability, self-consciousness and anxiety, amongst other factors (McCrae & Costa, 2004) and has been associated with a higher risk of developing internalising problems (e.g. Roelofs, Huibers, Peeters, & Arntz, 2008). Lahey summarised the association between N and mental health problems, particularly Axis I disorders such as mood and anxiety disorders as well as substance dependence demonstrating a strong link between this personality factor and ill mental health (Lahey, 2009). However, N was unrelated to alcohol use in adolescence (Ayer et al., 2011).

Extraversion: E is associated with assertiveness, excitement seeking and positive emotions (McCrae & Costa, 2004) and has been negatively associated with mental health problems such as mood disorders (Goodwin & Friedman, 2006; Levenson, Aldwin, Bossé, & Spiro, 1988). In terms of alcohol use behaviour it has been found that motives for drinking associated with the aim to increase positive mood are related to E (Kuntsche, Knibbe, Gmel, & Engels, 2006).

Conscientiousness: Goodwin and Friedman (2006) investigated the effect of FFM personality traits on mental health in a large cohort (N=3032). One of their key findings was that C was one of the most influential factors showing that high C decreased the likelihood of physical and mental problems as well as less physical limitations if physically ill. Additionally, C has

been found to be associated negatively to motives for drinking, e.g. using alcohol to cope with negative emotions (Loukas, Krull, Chassin, & Carle, 2000). Other studies supported the finding that lower C was related to drinking and drug taking (Chassin, Forth, & King, 2004). This may be due to the fact that low C is related to low self-discipline, deliberation and dutifulness (McCrae & Costa, 2004).

Agreeableness: A is linked to compliance, modesty and tender-mindedness, among other characteristics (McCrae & Costa, 2004). Low A has been found to be related to mental health problems generally (e.g. Trull & Sher, 1994), and to conduct problems and aggression in particular (Miller, Lynam, & Leukefeld, 2003). However, the link between mental health and A is weaker than for other FFM traits (Goodwin & Friedman, 2006). High A has, however, been shown to be related to a lower risk of substance dependence (Booth-Kewley & Vickers, 1994) and vice versa: low A is related to alcohol and illicit drug misuse (Chassin et al., 2004; Loukas et al., 2000).

Openness: Individuals with high O are imaginative, have complex emotional lives and are flexible in their thinking and behaviour (Costa & McCrae, 1992b). O is positively correlated with substance use risk (Booth-Kewley & Vickers, 1994; Chassin et al., 2004) but not with other mental health problems according to Goodwin and Friedman (2006).

This evidence suggests that personality traits can protect (high C, high A, high E, low N) but also put individuals at risk (low C, low A, high E, high N, high O) of developing mental health problems.

2.1.4. Adolescence and the age of onset of mental health problems

Mental health problems can develop early in life, with some problems, such as anxiety-related (internalising) or impulse-control-related (externalising) disorders starting at around

11 years of age (Interquartile Ranges: IQRs, age 6-21 years, age 7-15 years, respectively) as has been shown by Kessler and colleagues (Kessler et al., 2005). The same research group found that other problems such as substance dependence typically occur around the age of 20 (IQR age 18-27 years) and mood disorders even later (age 30, IQR age 18-43 years). These data show that all of these psychopathologies *can* already emerge in the significant developmental phase of adolescence. Although substance dependence typically develops somewhat later than other problems, the risk of engaging in alcohol and drug taking behaviour is high in adolescence (e.g. Schulenberg et al., 2005). In addition, the consequences of early age onset for drinking alcohol have been shown to increase the risk of lifetime alcohol dependence. For instance, in White and Hingson's study adolescents who started drinking at the age of 14 were four times more likely to develop lifelong alcohol dependence than individuals who started drinking at age 20 (White & Hingson, 2013). Therefore prolonging alcohol abstinence in adolescence and interventions targeting aspects related to specific personality traits may prevent future health problems and early death (WHO Global Information System, 2014).

Owing to the finding that mental health problems can develop in adolescence and in the case of alcohol use could cause dependence in the future, it is important to look at individuals in their teenage years in order to identify risk and protective factors. It should be possible to identify indicators that increase the likelihood of developing such disorders in the early teenage years, in this case personality traits. Identifying such potential risk factors - as well as protective factors – of these internalising and externalising mental health problems seems to be crucial for facilitating prevention and targeting treatment programmes.

2.1.5. The Data

Due to the fact that adolescence seems to be such an important developmental phase, the data in this study were taken from the IMAGEN project which is an ongoing longitudinal European project that investigates the genetic and neurobiological underpinnings of risk-taking behaviour, impulsivity, reinforcement sensitivity as well as psychiatric disorders in adolescents. It was used for a number of reasons. Firstly, it consists of a large cohort (N=2232) comprising adolescents across Europe (London, Nottingham, Dresden, Dublin, Mannheim, Berlin, and Paris), from a range of socioeconomic backgrounds. Secondly, participants were assessed using valid and accepted neuropsychological tests to measure behaviours relevant to this thesis (i.e. FFM personality traits, alcohol and drug use, clinical diagnoses of mental health problems), and finally, all participants were aged 14 at the time of data collection.

The IMAGEN project started in December 2007 when 2232 adolescents and their parents first participated. The adolescents completed a large number of personality questionnaires (e.g. NEO-Five Factor Inventory, Development and Wellbeing Assessment, Strength and Difficulties Questionnaire, etc.), parts of the Wechsler Intelligence Scale for Children (WISC), and the Cambridge Neuropsychological Test Automated Battery (CANTAB). Within neuroimaging sessions the adolescents completed a face processing task as well as stop-signal task as well as various structural scans. Blood samples were also taken to examine genetic and hormonal influences on behaviour, cognitive and mental health outcomes.

2.1.6. Current study

In the current study several questions are addressed using data obtained from the IMAGEN study:

1. To what extent are standard FFM personality traits (i) associated with mental health problems in general, (ii) related specifically to internalising and externalising disorders, as well as (iii) related to alcohol and drug use, in adolescents?

It is hypothesised that higher levels of N and lower levels of A and C would be associated with psychiatric problems, in line with previous research (Roelofs, Huibers, Peeters, & Arntz, 2008; Trull & Sher, 1994). Higher N should be specifically associated with a higher incidence of internalising problems whereas low A and C should be more related to externalising problems as well as substance use (Booth-Kewley & Vickers, 1994; Loukas et al., 2000). These associations would also be consistent with the links between low A, C and N and primary psychopathy, and low A and C and high N and secondary psychopathy.

2. To what extent are the PSPT scales (i) associated with mental health problems in general, (ii) relate specifically to internalising and externalising disorders as well as (iii) relate to alcohol and drug use, in adolescents?

It is hypothesised that higher primary psychopathic traits will predict fewer disorders in general and specifically fewer internalising disorders as primary psychopathic traits are thought to act as a resilience factor against these types of disorders (Witt, Donnellan, et al., 2009). Higher secondary psychopathic traits are predicted to be associated with increased internalising and externalising disorders as well as increased alcohol and drug use.

This study will also identify how the PSPT scale compares to the conventional FFM personality traits in predicting psychopathy-related mental health problems. This is the first study to assess the extent to which the PSPT scale offers value beyond the standard FFM traits in predicting psychopathy related mental health outcomes.

2.2. METHOD

2.2.1. Participants and procedure

Data from 2232 adolescents were available within the IMAGEN database². Data was excluded from further analysis if the gender of a participant was not specified and where issues regarding the validity of the quality of data existed. Validation checks for these data were collected to ensure as much as possible that the participants were not distracted during completion of the assessments which they completed at home. They were asked to indicate whether they were listening to music, if someone else was in the room, whether they were in a rush, etc. If they answered 'yes' to any of these validity questions, they were prompted to remove the distraction (i.e. stop the music, ask person present to leave the room). Therefore any data that was rated as doubtful or bad, hence where it was uncertain if the distraction was removed, was not further analysed. This resulted in a total of 1614 14-year-old participants included (787 males, 827 females, mean age=14.4, SD=0.42) across all research sites; England (Nottingham, London), Ireland (Dublin), France (Paris) and Germany (Dresden, Mannheim, Berlin, Hamburg). Participants were recruited via their local secondary schools. They received information and consent form packages, and school approval and parental written informed consent were obtained in all the countries for participation. Participants were informed of the confidentiality of their responses and of the voluntary nature of the study. Participants were excluded if they or their parents indicated that the participant had any MRI contraindications (e.g. tattoos or non-removable piercings) or

² As a research assistant on the IMAGEN project I was involved in the recruitment process, conducted the neuropsychological tests, psychometric assessments and imaging tasks with the adolescents and carried out the psychometric assessments with the parents. I was in this position for 1 year.

medical health issues such as heart disease, aneurysms as well as if children were born prematurely.

Each participant individually completed questionnaires via a home computer link to access a computer-based system before visiting the research institute (see section 2.2. Measures). After completing the home questionnaires, participants visited the research institutes where they were then asked to clarify about those distractions (i.e. why were they in a rush, did they take their time?), and the experimenter noted the quality of the data (good, doubtful or bad: only data rated 'good' was included in the current study). Participants then used the computer-based system to complete another measure (Development and Wellbeing Assessment: DAWBA) with supervision from an experimenter at the research institute. For the assessments of psychological disorders, parent and child data were collected.

2.2.2. Measures

A detailed description of the administration of all questionnaires and experimental tasks can be found in the IMAGEN Standard Operating Procedure: Neuropsychological testing - version 2.2 (http://www.imagen-europe.com/en/Publications_and_SOP.php). The following measures were used in the current analysis:

NEO-Five Factor Inventory (NEO-FFI: Costa & McCrae, 1992a). The 60-item NEO-FFI measured normal personality traits (Neuroticism: $\alpha = .81$, Extraversion: $\alpha = .72$, openness: $\alpha = .65$, agreeableness: $\alpha = .67$ and conscientiousness: $\alpha = .83$). Each trait was assessed with 12 items using a 5-point Likert scale (0= 'Strongly Disagree' to 4= 'Strongly Agree'). Participants filled out the questionnaire via a computer link from their computer at home, before visiting the institute. To minimize response bias, participants were asked to answer all questions alone, without music or other distractions.

Development and Wellbeing Assessment (DAWBA: Goodman, Ford, Richards, Gatward, & Meltzer, 2000). The DAWBA was used to identify psychiatric diagnoses based on the DSM-IV and ICD-10 and was completed in each research institute with supervision from experimenters. It was developed for the use in children and adolescents (age 5-16) with a total of 36 disorders. Typically the assessment is completed by both the child and parent within a structured interview. However, the assessment can also be completed on the computer with close experimenter supervision if participants/parents prefer. Information from parent and child was then brought together and the likelihood of a diagnosis was calculated by a computer programme. Subsequently, these computer-generated summaries were rated by a clinical rater who either confirmed the computer-given diagnosis (2= 'yes'), the absence of diagnosis (0= 'no') or put forward that there was some reason to suggest a possible diagnosis (1= 'unsure'). *Table 2.1.* summarises possible diagnoses.

European Schools Project on Alcohol and other Drugs (ESPAD: Morgan et al., 1999). The 42-item ESPAD (see *Appendix 2.1.*) was designed to explore substance use, attitudes and predictors of substance use (Morgan et al., 1999) and was completed on a computer at home. It assessed individuals' consumption and frequency of alcohol and illegal drugs such as cocaine, heroin or amphetamines in general, in the last year and in the past 30 days. Furthermore, it included items measuring alcohol use expectancies and binge drinking behaviour.

Table 2.1 DSM-IV diagnoses for internalising and externalising disorders

Internalising Disorders	
Anxiety disorders	Specific phobia, social phobia, panic disorder, agoraphobia, OCD, generalised anxiety, other anxiety
Mood disorders	Major depression, other depression, mania
Externalising Disorders	
ADHD disorders	ADHD combined, ADHD hyperactivity, ADHD impulsivity, other hyperactivity
Conduct Disorders	Oppositional defiant, conduct disorder, other disruptive

2.2.3. Data Analysis

The FFM personality traits were used as predictor variables for psychiatric diagnoses. This outcome variable was a count of diagnoses as measured by the DAWBA assessment and specifically internalising disorders and externalising disorders. Frequencies of these diagnoses were calculated for all participants (see Table 2.2).

Owing to the outcome variables being *count* variables, rather than continuous variables, Poisson regressions were used to analyse the data. This is because ordinary least square regressions would produce invalid test statistics and significance tests when count data such as these (rather than continuous data) were used (Coxe, West, & Aiken, 2009). A large

Table 2.2 Number of participants with clinical diagnoses and individuals who have consumed alcohol at least once in their lives

DSM-IV	N
Anxiety disorders	50
Mood disorders	50
Total Internalising disorders	100
ADHD disorders	39
Conduct disorders	44
Total Externalising disorders	83
Without diagnosis	1431
alcohol use	818
Total no. of participants	1614

number of participants displayed no DSM diagnoses, causing an over-representation of zeros in the data. Therefore all regressions were specified as zero-inflated with maximum likelihood and robust standard error as estimation for the analysis. The software package Mplus Version 6.11 (Mplus, Los Angeles, CA) was used. Zero-inflated Poisson (ZIP) models consist of two parts. The first part estimates the Poisson model for all the data that do not include structural zeros. In other words, it does not take into account participants who do not have a disorder. The second part consists of a logistic model which predicts the zeros (not having a disorder). Additionally, because Poisson models use a log-link function, typically the regression coefficients are exponentiated (raised by the base of e) to allow interpretation as rate ratios (RR) which indicate the predicted multiplicative effect of a 1-unit

change in the predictor on the outcome variable (Atkins & Gallop, 2007). In the logistic models they are interpreted as odds-ratios (*OR*; Atkins and Gallop, 2007) whereby an *OR* of 1 indicates no significant relationship between variables but any difference from 1 can be interpreted as percentage increase (if >1) or decrease (if <1) in the outcome. All outcomes (psychopathologies in general, internalising and externalising disorders) were tested first with the FFM personality traits and then with the PSPT scales as predictor variables and model fits were compared to identify the better fitting model using the Bayes Information Criterion (BIC: Schwartz, 1978).

Next, the FFM personality traits were used as predictor variables for life time alcohol and drug use frequency, measured by the ESPAD. Due to the outcome measures being *count* data and due to a high percentage of participants indicating *no* substance use, zero-inflated Poisson regressions were computed here too. Two Poisson models were computed, for alcohol use and for drug use separately.

2.3. RESULTS

2.3.1. FFM personality traits and psychiatric disorders

The first aim was to assess to what extent FFM traits predicted psychiatric diagnoses based on the DSM-IV and specifically internalising and externalising disorders. The ZIP model showed that Agreeableness (A) was a significant predictor with lower A predicting a higher number of diagnoses in general ($b=-0.37$, $S.E.=.19$, $RR=.69$, $p<.05$). The exponentiation of the regression coefficient for A ($RR= e^{-0.37} = 0.69$, $1/.69= 1.5$) showed that for every one-unit decrease in A the rate of having a clinical diagnosis increase by a factor of 1.5. Neuroticism (N) positively predicted clinical diagnoses ($b=0.53$, $S.E.=.18$, $RR=1.70$, $p<.01$). Here, with

every one-unit increase in N the rate of having a clinical diagnosis increased by 1.7. Another significant association was found for Conscientiousness (C) ($b=-0.56$, $S.E.=.20$, $RR=.57$, $p<.01$) whereby for every one-unit decrease in C the rate of having a clinical diagnosis increased by 1.8.

However, Extraversion (E) and Openness (O) were not significantly associated with psychiatric diagnoses in this sample ($b=0.25$, $S.E.=.49$, $p=.61$; $b=-0.07$, $S.E.=.53$, $p=.90$; respectively).

In terms of internalising disorders, the ZIP model showed significant associations with Openness (O) ($b=0.53$, $S.E.=.27$, $RR= 1.70$, $p<.05$) and Agreeableness (A) ($b=-0.72$, $S.E.=.28$, $RR=.49$, $p<.01$). With every one-unit increase in Openness the rate of having internalising problems increase by 1.7. On the other hand, lower levels in A increased the likelihood of internalising problems. All other FFM personality traits were not significantly associated with internalising disorders ($ps>.05$).

For externalising disorders, Openness (O) was the only significant predictor ($b=-.87$, $S.E.=.15$, $RR=.42$, $p<.001$). With a one-unit decrease in O the rate of having externalising problems increased by 2.4. The other FFM traits were not significantly associated with this outcome measure ($ps>.05$).

2.3.2. FFM personality traits and alcohol and drug use

Next, it was tested whether the FFM personality traits predicted lifetime alcohol use frequency (*count* variable). Owing to the fact that a large proportion of the sample indicated never having had alcohol ZIP regressions were conducted. These analyses revealed that low Agreeableness (A) was a significant predictor of alcohol use ($b=-.27$, $S.E.=.06$, $RR=.76$, $p<.001$) indicating that with each one-unit decrease in A the rate of consuming alcohol increased by

a factor of 2.1. All other FFM traits were not significantly related to alcohol use in this sample. However, in the logistic analysis of this model low E ($b=-.52$, $S.E.=.27$, $OR=.59$, $p<.05$) was associated with the absence of alcohol use. High A ($b=.66$, $S.E.=.31$, $OR=1.93$, $p<.05$) and high C ($b=.82$, $S.E.=.22$, $OR=2.27$, $p<.001$) were also associated with the absence of alcohol use. Here with every one-unit increase in levels of A and C the odds of not consuming alcohol increased by a factor of 2.

It was then examined whether FFM personality traits could predict drug use, calculated by how many times participants had consumed any drug over the lifetime. The ZIP model showed that N ($b=-.68$, $S.E.=.33$, $RR=.51$, $p<.04$) and C ($b=-1.52$, $S.E.=.29$, $RR=.22$, $p<.001$) were significantly associated with drug use frequency. With every one-unit decrease in N and C the rate of taking more drugs increased by 2 and 4.5, respectively. All other personality traits were not significantly related to drug use frequency ($ps>.05$). The logistic regression model indicated that O was significantly related to the absence of drug use ($b=-.35$, $S.E.=.18$, $OR=.70$, $p<.05$). For every one-unit increase in O the odds of abstaining from alcohol increased by 1.4. C was marginally related to the absence of drug use ($b=.34$, $S.E.=.19$, $OR=1.4$, $p=.07$), indicating that with every one-unit increase on the C scale the predicted odds of not taking drugs increased by 4.

2.3.3. PSPT scale

PSPT scores were calculated for all participants based on the NEO-FFI. *Table 2.3* below shows the items of the NEO-FFI that were rated to belong to the primary and secondary psychopathic factor.

Table 2.3. NEO-FFI items loaded onto primary and secondary psychopathic traits

PSPT: Primary Psychopathic Traits Scale	
1.	I am not a worrier.
2.	I often feel inferior to others. (r)
3.	When I'm under a great deal of stress, sometimes I feel like I'm going to pieces. (r)
4.	Some people think I'm selfish and egotistical.
5.	I rarely feel lonely or blue.
6.	I would rather cooperate with others than compete with them. (r)
7.	I often feel tense and jittery. (r)
8.	Poetry has little or no effect on me.
9.	Sometimes I feel completely worthless. (r)
10.	I rarely feel fearful or anxious.
11.	I often feel as if I'm bursting with energy.
12.	I seldom notice the moods or feelings that different environments produce.
13.	I believe we should look to our religious authorities for decisions on moral issues. (r)
14.	Some people think of me as cold and calculating.
15.	I'm hard-headed and tough-minded in my attitudes.
16.	I am seldom sad or depressed.
17.	I generally try to be thoughtful and considerate. (r)
18.	I often feel helpless and want someone else to solve my problems. (r)
19.	I am a very active person.
20.	At times I have been so ashamed I just wanted to hide. (r)
21.	If necessary, I am willing to manipulate people to get what I want.
PSPT: Secondary Psychopathic Traits Scale	
1.	I keep my belongings neat and clean. (r)
2.	I often get into arguments with my family and co-workers.
3.	I'm pretty good about pacing myself so as to get things done on time. (r)
4.	I try to perform all the tasks assigned to me conscientiously. (r)
5.	I have a clear set of goals and work toward them in an orderly fashion. (r)
6.	I waste a lot of time before settling down to work.
7.	I work hard to accomplish my goals. (r)
8.	I often get angry at the way people treat me.
9.	Too often, when things go wrong, I get discouraged and feel like giving up (r)
10.	I am a productive person who always gets the job done. (r)
11.	I never seem to be able to get organized.
12.	Sometimes I'm not as dependable or reliable as I should be.

Note. (r) denotes item scoring is reversed.

First, the internal consistency of the scales was calculated³. For primary psychopathic traits the internal consistency was moderate ($\alpha=.66$). The alpha could not be improved by removing any of the items. The internal consistency for secondary psychopathic traits was good ($\alpha=.79$). These findings are consistent with Heym and colleagues' findings ($\alpha=.65$, $\alpha=.78$, respectively; Heym et al., submitted).

2.3.4. PSPT scores and the relationship to general psychiatric diagnoses, internalising and externalising disorders and alcohol and drug use

It was hypothesised that PSPT scores would differentially predict psychiatric disorders such that primary psychopathic traits would predict fewer incidences of psychiatric disorders whereas secondary psychopathic traits would predict higher incidences of psychopathologies in general.

Primary and Secondary PSPT scores were used as predictor variables and diagnosis count was used as outcome variable in ZIP regressions. The results are summarised in *Table 2.5*. A significant relationship was found for both primary and secondary psychopathic traits and incidences of psychiatric diagnoses. Primary PSPT scores were related to number of diagnoses ($b=-.60$, $S.E.=.22$, $RR=.55$, $p<.01$). With every one-unit decrease in primary PSPT scores the odds of having a clinical diagnosis increased by 1.8. Conversely, higher secondary PSPT scores were related to increased psychiatric diagnoses ($b=.70$, $S.E.=.19$, $RR=2.01$, $p<.001$). With every one-unit increase in PSPT secondary psychopathic traits the risk of having a diagnosis increases by 2. The logistic model showed the same pattern whereby higher primary PSPT traits ($b=.22$, $S.E.=.05$, $OR=1.25$, $p<.001$) as well as lower secondary

³ The Data for the two scales were normally distributed with PSPT primary (skew= -.11, $S.E.=.06$, kurtosis= .15, $S.E.=.12$) and PSPT secondary (skew= -.01, $S.E.=.06$, kurtosis= .06, $S.E.=.12$)

PSPT traits ($b=-.29$, $S.E.=.04$, $OR=.75$, $p<.001$) predicted the absence of clinical problems.

Here for every one-unit increase in PSPT primary psychopathic traits the predicted odds of not having a clinical diagnosis increased by 2.5. On the other hand, with every one-point decrease in secondary psychopathic traits the odds of having a clinical diagnosis increased by 1.3.

Secondly, the effect of PSPT psychopathic traits on internalising and externalising disorders was examined. Primary and secondary psychopathic-like traits as measured by the PSPT were again used as predictor variables and counts of internalising and externalising disorders as outcome variables. The zero-inflated Poisson model showed that there was a marginally significant effect of primary PSPT scores on internalising disorders ($b=-1.28$, $S.E. =.70$, $RR=.28$, $p=.066$). Here, with every one-unit decrease in primary PSPT scores the rate of having more internalising disorders increased by 3.6. However, primary psychopathic traits did not significantly predict externalising disorders ($b=.11$, $S.E.=.81$, $p=.89$) in this sample. The logistic model showed that a higher score in primary psychopathic traits predicted the absence of internalising disorders ($b= 2.21$, $S.E.=.81$, $OR= 9.12$, $p<.01$). With every one-unit increase in primary psychopathic traits the predicted odds of having *no* internalising disorder increases by a factor of 9.1. Primary psychopathic traits were not significantly associated with the absence of externalising disorders ($b= -1.13$, $S.E. =1.21$, $p=.35$).

In terms of the relationship between internalising and externalising disorders and secondary psychopathic traits it was found that there was no significant association ($b=.58$, $S.E.=.46$, $p=.21$; $b=.31$, $S.E.=.68$, $p=.64$, respectively). The logistic regression showed that secondary psychopathic traits also did not predict the absence of internalising disorders ($b=-.04$, $S.E. =.53$, $p=.94$). However, there was a marginally significant effect of secondary psychopathic

traits on the absence of externalising disorders ($b=-1.96$, $S.E.=1.06$, $OR=0.14$, $p<.066$). Here, with every one-unit decrease in secondary psychopathic traits the odds of reporting an externalising disorder increased by a factor of 7.1.

2.3.5. PSPT scores and alcohol and drug use

Lastly, it was tested how primary and secondary PSPT scores were related to alcohol and drug use. Lifetime alcohol use frequency and lifetime drug use frequency were used as outcome variables. Since these variables are counted behaviours and a large proportion of the sample had never drank alcohol or taken illicit drugs zero-inflated Poisson regressions were used. PSPT secondary psychopathic-like traits were found to predict lifetime alcohol use ($b=.16$, $S.E.=.05$, $RR=1.17$, $p<.001$). With every one-unit increase in secondary psychopathic traits the rate of drinking higher quantities of alcohol was increased by 1.2. PSPT primary psychopathic traits were not significantly related to alcohol use frequency ($b=.10$, $S.E.=.06$, $p=.10$). The logistic analysis of this model showed the same pattern with secondary psychopathic-like traits being negatively related to the absence of alcohol use ($b=-.99$, $S.E.=.21$, $OR=3.22$, $p<.001$) and no effect of primary psychopathic-like traits ($b=-.21$, $S.E.=.26$, $p=.42$). For drug use frequency, the ZIP model indicated significant positive associations between both primary and secondary PSPT scales and drug use ($b=.62$, $S.E.=.23$, $RR=1.86$, $p<.01$; $b=.63$, $S.E.=.20$, $RR=1.88$, $p<.001$, respectively). With every one-unit increase in primary and secondary psychopathic traits the rate of engaging in more frequent drug taking behaviour increased by 1.9. Less secondary PSPT scores were also associated with the absence of drug use in the logistic model ($b=-.59$, $S.E.=.18$, $OR=0.55$, $p<.001$). Here, with every one-unit increase in secondary psychopathic traits the odds of abstaining from drugs decreased by 2.

The models using the FFM personality traits were then compared to the models using the PSPT scales as predictors of mental health problems. *Table 2.4* below details the BIC values of all models with lower values indicating better fit.

Table 2.4. BIC values for model fits of FFM and PSPT Poisson regressions

Outcome	FFM	PSPT
overall psychiatric diagnoses	242.45	1602.15
Intern./extern. Disorders	2695.84	1396.62
Alcohol use frequency	5896.78	5896.84
Drug use frequency	1758.71	1727.09

According to the BIC values the PSPT measures seemed to have a better model fit for internalising and externalising disorders as well as drug use behaviour. The FFM traits showed a better fit for general psychiatric diagnoses. Both models show an equally good fit for alcohol use.

Table 2.5. ZIP models for FFM and PSPT factors and psychiatric diagnosis. Poisson regressions for alcohol and drug use.

		Overall diagnosis			Internalising			Externalising		
		B	SE B	RR	B	SE B	RR	B	SE B	RR
Model 1	O	-0.07	0.53	-	0.53*	0.27	1.7	-0.87***	0.15	0.42
FFM traits	C	-0.56**	0.2	0.57	-0.42	0.3	-	-0.17	0.6	-
	E	0.25	0.49	-	0.43	0.34	-	0.33	0.45	-
	A	-0.37*	0.19	0.69	-0.72**	0.28	0.49	-0.16	0.61	-
	N	0.53**	0.18	1.7	-0.28	0.31	-	-0.19	0.64	-
Model 2	PSPT Primary	-0.6***	0.22	0.55	-1.29^	0.7	-	0.11**	0.81	1.12
	PSPT Secondary	0.7***	0.19	2.01	0.58	0.46	-	0.31	0.68	-

Note. RR= Rate Ratio; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; PSPT= Primary and Secondary Psychopathy Traits
^ $p=.07$; * $p<.05$; ** $p<.01$; *** $p<.001$.

		Alcohol use			Drug use		
		B	SE B	RR/OR	B	SE B	RR/OR
Model 1	O	0.04	0.05	-	0.13	0.21	-
FFM traits	C	-0.07	0.04	-	-0.85***	0.16	.43
	E	0.09	0.05	-	0.31	0.20	-
	A	-0.27***	0.06	-	-0.36	0.24	-
	N	0.001	0.04	-	-0.42*	0.21	.66
Logistic	O	-0.16	0.22	-	-.09*	.05	.91
	C	.82***	.22	-	.10	.06	-
	E	-.52*	.27	-	-.04	.05	-
	A	.66*	.31	-	.08	.05	-
	N	-.15	.17	-	-.09	.06	-
Model 2	PSPT Primary	.10	.06	-	0.62*	0.23	1.86
	PSPT Secondary	.16***	.05	-	0.63***	0.2	1.88
Logistic	PSPT Primary	-.21	.26	-	-.01	.26	-
	PSPT Secondary	-0.99***	.21	-	-.59***	.18	.55

Note. RR= Rate Ratio; OR= Odds Ratio; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; PSPT= Primary and Secondary Psychopathy Traits
^ $p=.07$; * $p<.05$; ** $p<.01$; *** $p<.001$.

2.4. DISCUSSION

The study set out to examine the relationship between personality traits based on the FFM of personality and psychopathologies, alcohol and drug use within a large sample of 14-year old adolescents. This was done using the NEO-FFI measure of personality to index the standard FFM traits and the newly developed Primary and Secondary Psychopathic Traits (PSPT) scales. Both approaches were also used to examine the extent to which they predicted internalising and externalising problems in ways proposed by findings in the literature and whether the PSPT measure of psychopathy-related traits could predict the clinical outcomes better than the standard FFM of personality traits.

2.4.1. FFM personality traits and psychopathologies

The five broad personality traits, based on the FFM, were examined in terms of their ability to predict psychiatric problems. It was found that in this sample A, N and C were the best predictors of psychopathologies in general. This is congruent with findings in the literature. For instance, Goodwin & Friedman (2006) showed that individuals with lower A were more likely to have a clinical diagnosis. A has been implicated in predicting antisocial outcomes, such as conduct problems and aggression (Miller, Lynam, & Leukefeld, 2003) and is associated with psychopathy, especially primary psychopathy (e.g. Derefinko & Lynam, 2006; Roose et al., 2012). It should therefore follow that A would inversely predict externalising disorders. However, A was not significantly associated with externalising disorders in this sample. Perhaps no link could be identified because the number of individuals within the sample who presented with conduct problems was too small. Out of 1614 participants only

83 individuals presented with externalising disorders that may have prevented any effects from being identified.

Next, it was found that individuals with high N and low C were more likely to have mental health problems in general. This is consistent with findings showing strong support for the involvement of these personality traits on mental health (Goodwin & Friedman, 2006; Roelofs et al., 2008). It was expected that N would also be related specifically to internalising disorders due to its association with anxiety and depression (e.g. Lahey, 2009). However, this was not found here. Again, a relatively small number of individuals (50 participants) were diagnosed with mood disorder and 50 with anxiety disorder. This number may have been too small to find associations with personality.

It was expected that low C was associated with a higher number of externalising disorders due to its link with psychopathy (Roose et al., 2012; Salekin & Lynam, 2010). This prediction could not be supported here. Studies that have looked at the association between FFM personality traits and externalising behaviours have found strong links with A and C (Jones, Miller, & Lynam, 2011; Miller, Lynam, & Jones, 2008). However, in Miller et al.'s study participants were older than in the current sample (Mean= 18.6 years). Also, a meta-analysis by Jones and colleagues (2011) included many studies that had examined adults or older teenagers. Perhaps the link between A, C and externalising problems grows stronger in the later teenage years and therefore may explain why no association was found in this sample. Additionally, the measure of externalising problems in the current sample was a clinical measure. It is possible that more adolescents had externalising tendencies but at a lower, subclinical level which could not be identified by the measure used here. Perhaps other measures that examine behaviours related to externalising problems, such as aggression, or

antisocial tendencies would identify a wider spectrum of behaviours that could increase individuals' risk for externalising problems in the future.

Openness predicted internalising disorders whereby individuals with high O were more likely to have mood- or anxiety-related problems. This is in line with findings by Koorevaar and colleagues who found that high O was related to an earlier age onset of depression (Koorevaar et al., 2013). In the current study, low O was found to be associated with a higher number of externalising disorders. This is somewhat contradictory with other evidence in the literature showing no relationship between O and mental health problems generally (Goodwin & Friedman, 2006) and specifically for internalising and externalising behaviour (Fruyt, Mervielde, & Leeuwen, 2002; Malouff, Thorsteinsson, & Schutte, 2005).

2.4.2. FFM personality traits and alcohol and drug use

The relationship between FFM personality traits and alcohol and drug use was examined and it was found that A and C were negatively related to alcohol and drug use, as was predicted. This fits in with evidence by Chassin and colleagues, showing that individuals with the lowest C scores were most likely to be part of the heavy drinking/drug taking group (Chassin et al., 2004). Their longitudinal study examined FFM traits in relation to alcohol and drug use from adolescence to adulthood. Individuals were grouped into abstainers, moderate drinkers/drug users and heavy drinkers/drug users. C was also negatively associated with drug use (Kuntsche, Knibbe, Gmel, & Engels, 2006; Stewart & Kushner, 2001). Stewart and Kushner (2001) argued that individuals with low self-discipline and low deliberation (low C) are more likely to behave in ways that give them instant rewards, such as the initial effects of alcohol. At the same time they are not as concerned about the long-term consequences of their actions, which puts them at heightened risk of alcohol and drug misuse. In addition, to

the findings here, those high in C were more likely to abstain from drug use, although this effect was marginal.

It was further found that individuals with lower levels of E were less likely to have ever consumed alcohol. Research has shown that induction of positive mood states via drinking alcohol was associated with high E (Kuntsche et al., 2006) and may therefore explain the link of E and alcohol consumption. However, no significant relationship to illicit drug taking was found here.

O was not found to be related to alcohol consumption or drug use. These findings are consistent with other research where examination of the FFM traits and alcohol use showed no relationship with Openness (Loukas et al., 2000). However, Chassin and colleagues (2004) found that those high in Openness were significantly more likely to be part of the heavy drinker/drug taking group than individual with higher Openness scores. However, Openness was found to be a predictor of alcohol use in adulthood. This may explain why no such association was found in this sample, with participants being only 14 years of age.

It was further found that N was unrelated to alcohol use. Typically high N is associated with alcohol use in adults (Malouff, Thorsteinsson, Rooke, & Schutte, 2007). Especially the impulsiveness facet of N has been found to relate to drinking (Ruiz, Pincus, & Dickinson, 2003). However, Ayer and colleagues looked, amongst other things, at the relationship between FFM personality traits and adolescent/young adult drinking. They argued that N alone may not be a good predictor of alcohol use. Instead it should perhaps be understood in a wider context of complex personality patterns (Ayer et al., 2011). So perhaps this is why N on the domain level is not showing an association with drinking. However, low N was linked to more frequent drug use. This is somewhat inconsistent with the literature as N is

typically found to be positively associated with substance misuse and dependence (Chassin et al., 2004).

Perhaps one reason for the finding here that low N was associated with more substance use is that alcohol and drug misuse is, amongst other things, related to self-medicating behaviour, for instance when individuals are depressed or anxious (Loukas et al., 2000). This could explain the relationship between N and drug abuse. However, 14 year old adolescents may not yet consider drugs as a (maladaptive) coping strategy due to the small amount of experience with it. Importantly, for most young adolescents the obtaining of illicit drugs is a high risk activity and may discourage those who are more anxious (high N) from taking part in these activities together with the possible anxiety about the possible effects of the drugs. Instead it will perhaps be those with high E who will pursue these activities because it is exciting and is related to one of the sub-facets of E which is *excitement seeking* (McCrae & Costa, 2004).

The current findings replicate some of the findings reported in previous research suggesting that certain personality traits observable within the normal population increase the risk of psychopathologies as well as alcohol and drug use. This is already detectable in adolescence, where the relative incidences of mental health problems and alcohol and drug use is small. Especially individuals with high N and low C are more likely to be at risk of mental health problems and individuals with high E and low C are at higher risk of engaging in substance use behaviour.

2.4.3. PSPT and psychopathologies

This study sought to investigate whether the newly developed PSPT scales were related to psychiatric diagnoses and alcohol and drug use in theoretically meaningful ways. First, the

reliability of the PSPT scales were tested. It was found to be moderate for primary psychopathic traits and good for secondary psychopathic traits, which is in line with Heym et al.'s findings (submitted). Perhaps one reason for the slightly lower internal consistency of the PSPT primary scale is that, although not dramatic, the data were slightly negatively skewed. This could have affected the correlation coefficients.

Also, while standard personality traits can be informative for diagnosing personality disorders, researchers typically used the much longer FFM measure, the NEO-PI-R which contains 240 items rather than the 60 items in the NEO-FFI (Miller et al., 2001; Widiger & Mullins-Sweatt, 2009). Therefore, proxy measures of psychopathy based on this longer measure may be more likely to tap into aspects linked to primary psychopathy than the proxy measure based on the shorter NEO-FFI version. The PSPT scale (especially the primary subscale) should therefore be treated with caution.

Next, PSPT scores were used to examine the relationship between psychopathy-like traits and psychiatric disorders. Research suggests that primary psychopathic traits are associated with fewer psychiatric problems, especially internalising disorders (Benning et al., 2005). It was hypothesised that primary psychopathic traits were a protective factor against such disorders. On the other hand, secondary psychopathic traits were hypothesised to be related to higher numbers of both internalising and externalising disorders. The results partially support these findings.

Primary psychopathic-like traits were associated with fewer clinical disorders in general and specifically with fewer internalising disorders, although this was only a trend. However, it is in line with previous research and suggests that primary psychopathic traits may act as a protective factor against such psychopathologies (e.g. Skeem et al., 2007). Skeem and

colleagues showed that prison inmates with primary psychopathic traits had significantly fewer mental health problems, lower trait anxiety and were more emotionally stable than inmates with secondary psychopathic traits or no psychopathic traits. These findings here extend these associations to adolescents in the community.

Primary PSPT scores did not, on the other hand, predict externalising disorders. One reason for this finding may be that out of those individuals in the sample who showed externalising disorder, almost half had a diagnosis of ADHD. However, ADHD has been found to be a poor predictor of psychopathic traits (Frick, 2009) and may be why no association was found here. In his study, Frick distinguished subgroups of adolescents with antisocial youth with conduct problems on the basis of callous-unemotional traits which are more closely related to psychopathy. He argued that individuals with both Conduct Disorder (CD) and ADHD were likely to be more aggressive and more likely to be incarcerated in adulthood. However, ADHD alone was not a good indicator of psychopathic tendencies. In the current sample, of the 83 individuals identified with externalising disorders, 39 were diagnosed with ADHD and 44 with CD. 6 individuals from this group had a combined diagnosis. It is possible that a link between CD and primary psychopathy exists but on the basis of the externalising problems within this sample this could not be identified here.

Secondary psychopathic-like traits were found to increase the risk for clinical disorders in general. Furthermore, individuals were more likely to be free of externalising disorders if they had lower secondary psychopathic-like traits. Skeem and colleagues (2007) showed that incarcerated individuals high in secondary psychopathy were more hostile than primary psychopaths and more reactive which fits with evidence that they score higher on externalising problems. Surprisingly though, secondary PSPT scores did not predict

internalising disorders in this study. Other research has shown that secondary psychopathic traits in adolescents (aged 17) were related to internalising and externalising problems (Blonigen, Hicks, Krueger, Patrick, & Iacono, 2005). The group did however find sex differences in that secondary psychopathic traits, as measured by the Multidimensional Personality Questionnaire (MPQ: Tellegen, in press), were associated with internalising problems only in women. However, due to the very small subgroup of individuals in this sample with clinical diagnoses it would have been problematic to examine the relationship between the psychopathy constructs and psychopathology in males and females separately. However, this could be one reason for why no relationship was found.

Secondary PSPT scores did, however, predict more frequent alcohol and drug use as was predicted and is in line with findings in the literature (Hicks, Markon, Patrick, Krueger, & Newman, 2004). Primary psychopathic traits were not related to alcohol use in our sample and are typically found to be less strongly associated with alcohol misuse (Kimonis, Tatar, et al., 2012; Smith & Newman, 1990). Higher primary PSPT scores were, however, associated with drug use specifically. Hicks and colleagues (2004) found increased drug abuse and dependence disorders only for Factor 2 of psychopathy, not Factor 1. However, in this sample dependence disorders and severe drug abuse are most unlikely because the sample was young. It is, however, a time when groups of peers experiment with alcohol and drugs such as Cannabis. Adolescents with primary psychopathic traits are not likely to be anxious (low N) about taking drugs and may perhaps demonstrate their dominance within their peer group through substance use behaviour. Social dominance in individuals with primary psychopathic traits has been demonstrated and is in fact part of the assessment of primary psychopathy within the framework of the Psychopathic Personality Inventory (Benning, Patrick, Hicks, Blonigen, & Krueger, 2003). In summary, individuals with low N and higher

psychopathic traits were at an increased risk of engaging in alcohol and drug taking behaviour.

Given the findings of the FFM traits and PSPT scale predicting psychopathic outcomes, the question remains whether the specific FFM items that make up the PSPT scale can predict psychopathy-related outcomes better than the standard FFM traits. Our findings indicate that the FFM model was more effective in predicting clinical diagnoses in general than the PSPT scale. N, A and C were predictive of diagnoses which have received strong support within the literature for their relationship to mental health problems (Goodwin & Friedman, 2006; Miller et al., 2003). However, the PSPT model seemed to better predict internalising and externalising disorders. Since primary and secondary psychopathic traits are differentially related to mental health problems an effect for diagnoses in general may have been cancelled out.

Lastly, both the FFM and PSPT were comparably strong in predicting alcohol and drug use. This suggests that the PSPT may be as good as the standard FFM traits at predicting psychopathy-related outcomes. However, the PSPT may be better suited for examining relationships with specific mental health-related outcomes than the standard FFM traits.

It is also important to remember that the model fit comparison is not objective as it does not compare each fit to a baseline. Therefore we cannot be sure if the models actually have a good fit, only that one might be better than the other. Another way of testing which traits may have more predictive value would be by using continuous outcomes and computing hierarchical regressions. However, it would not be possible to include the FFM traits as well as the PSPT factors in the same model because the PSPT measure is based on some of the

same FFM items. The approach used here gives us at least one possibility to compare the model fits.

Psychopathy is a construct that even to this date is not measured by one fixed scale. There is much debate about the underlying structure; whether there should be three or four sub-factors (Cooke, Michie, & Skeem, 2007) and consequently there are a number of different measures that capture different aspects of what is believed to be the construct of psychopathy. Although links to normal personality traits have been identified in the literature, it would be ambitious to assume that items from the short personality measure, the NEO-FFI, can capture the entirety of the psychopathy construct. However, the PSPT scale did show some similarities to other measures of primary and secondary psychopathy and may serve as proxy measure.

2.4.5. Future Directions

While this study examined the link between FFM and the PSPT factors and clinical outcomes related to psychopathy, the association between these traits and validated psychopathy scales have not been demonstrated here. In order to explore further this idea of using FFM personality traits based on the NEO-FFI to measure psychopathic-like traits it is necessary to compare the PSPT scales with existing, validated measures of psychopathy and examine how they compare in predicting antisocial outcomes.

It would be very informative to examine the follow-up data from these individuals at time 2 (age 16) and time 3 (age 18) to look at possible risk and protective factors of psychopathologies. At those later phases individuals prone to mental health problems would perhaps have a firm diagnosis. In the current sample not many individuals had been

diagnosed with psychiatric disorders which made the analysis more difficult and results somewhat questionable.

Negative life events, such as physical and sexual abuse or having parents who have been incarcerated, are associated with antisocial problems, such as Conduct Disorder or Oppositional Defiant Disorder in children (S. M. Green, Russo, Ph, Navratil, & Loeber, 1999; Myers, Ph, Smarsh, Amlund-hagen, & Kennon, 1999; Tiet et al., 2001). These factors have been shown to play a role as well as whether or not children were exposed to alcohol and drugs in the home environment and may have had an impact on the adolescents in this sample. However, these factors could not be addressed here.

2.5. CONCLUSION

Overall, the findings relating to the association between the FFM personality traits and PSPT scales with psychopathologies (including alcohol and drug use) were mostly consistent with findings from the literature. However, some of these findings only showed trends rather than significant relationships but this may be due to the limited amount of adolescents with clinical diagnoses in this sample. The PSPT primary and secondary proxy scale of psychopathy seemed to predict internalising and externalising disorders better than the standard FFM traits. However, further examination of the PSPT scale is necessary. Specifically, it is necessary to compare the scale with already established, well-validated psychopathy scales on a comparable sample of adolescents and examine how these measures predict outcomes such as alcohol and drug use as well as other psychopathy-related outcomes. This will be the aim of the next study.

CHAPTER 3: THE EFFECT OF NORMAL AND PSYCHOPATHIC PERSONALITY TRAITS ON AGGRESSION AND ALCOHOL USE

3.1. CHAPTER OVERVIEW

Chapter 2 examined the extent to which the standard Five-Factor Model (FFM) personality traits and a proxy psychopathy measure, the Primary and Secondary Psychopathic Traits (PSPT) scale, were able to predict psychopathy-related outcomes. The current chapter aims to (i) replicate the findings from Study 1 by examining the FFM personality traits and the PSPT in predicting alcohol use in a sample of 14 year old adolescents, (ii) to extend the research by including a validated measure of psychopathy, the Youth Psychopathy Inventory (YPI: Andershed, Kerr, Stattin, & Levander, 2002), against which to compare the predictive validity of the FFM and the PSPT; (iii) to extend the examination of the predictors of psychopathy and the FFM to examine their impact on proactive and reactive aggression and (iv) assess associations between normal and psychopathic personality traits and alcohol use and aggression in different developmental stages (i.e. early adolescence and young adulthood). The studies in this chapter will examine how normal and psychopathic personality traits are associated with alcohol use and aggression independently, but also whether the FFM traits and PSPT factors predict these outcomes over and above the YPI. The following sections outline the links between alcohol use and aggression (proactive and reactive) with FFM and psychopathy traits in turn.

3.2. ALCOHOL USE

The previous chapter examined, amongst other things, the relationship between standard FFM personality traits, the PSPT and alcohol use in 14 year olds to identify if certain traits are particular risk factors for the elevated use of alcohol. Although drinking alcohol is a normative behaviour in Western society, the consequences of excessive drinking can be severe. High quantities of alcohol consumption increase risk-taking behaviour such as sexual assault or drunk driving (White & Hingson, 2013). Crucially, earlier age onset of alcohol use increases the risk of lifetime alcohol dependence. Alcohol age onset at 14 years makes adolescents four times as likely as individuals who start drinking at age 20 to develop lifelong alcohol dependence (White & Hingson, 2013). Understanding alcohol use and misuse is also important because alcohol dependence is associated with externalising disorders such as Conduct Disorder and Antisocial Personality Disorder (Strain, 1995) as well as criminal behaviour (Soderstrom, Sjodin, Carlstedt, & Forsman, 2004).

3.2.1. Alcohol use and the Five Factor Model of personality

Studies investigating the link between the FFM personality traits and alcohol aim to identify personality profiles that increase the risk of engaging in alcohol use and misuse behaviour. Such studies have identified low Agreeableness (A), low Conscientiousness (C) and high Neuroticism (N) to be associated with alcohol use (Malouff et al. 2007). Some studies have also found a relationship between alcohol use and high Extraversion (E) (Booth et al., 2013; Hopwood et al., 2007). These FFM traits have been found to be differentially related to motives of drinking (Kuntsche et al., 2006). For instance, high E and low C have been found to be associated with motives of enhancements. In Kuntsche's study individuals with high levels of E liked to drink alcohol to enhance their mood, probably due to their sociable

nature and sensitivity to positive affect. Individuals with low levels of C are not as considerate and self-disciplined as individuals with higher levels of C (Kuntsche et al., 2006; McCrae & Costa, 2004). They may for instance excessively drink on a week day despite having to go to work early the next day.

In comparison, Kuntsche and colleagues found that low A and high N were not related to enhancement motives but coping motives (2006). High N is related to increased sensitivity to negative emotional stimuli and low A is, amongst other things, associated with interpersonal conflict. This may explain why such individuals use alcohol as a coping strategy to deal with negative, distressing emotions and situations.

In summary, low C, high E, high N and low A have been found to be related to alcohol use and motives for drinking. The results from study 1 conducted with 14 year-old adolescents showed a similar pattern whereby alcohol use frequency was predicted by high E as well as low A and C. However, N was unrelated to alcohol use in Study 1.

3.2.2. Alcohol use and psychopathy

Research on the link between psychopathy and alcohol misuse has suggested a link between the two constructs. For instance, genetic research found that psychopathic traits as measured by the Psychopathy Checklist-revised (PCL-R: Hare 1991) and substance misuse disorder potentially share common genotypes (Ponce et al., 2008). A study that investigated alcohol and drug dependence in criminal offenders found that both alcohol and drug dependence were related to Factor 2 of psychopathy, i.e. secondary psychopathy, but were unrelated to Factor 1, i.e. primary psychopathy (Smith & Newman, 1990). As demonstrated by these authors, measures of alcohol use can be useful for examining differences between primary and secondary psychopathic traits.

A link between psychopathy and alcohol misuse has also been demonstrated in non-forensic populations. Neumann and Hare examined a random adult community sample (N=514) and found that individuals with higher psychopathic traits showed higher levels of alcohol use (Neumann & Hare, 2008). Although the alcohol use measure in their study was not ideal (it was asked on how many days in the past week participants had consumed different types of alcohol, i.e. beer, wine, and liquor) it suggests that a relationship between psychopathic traits and alcohol use potentially exists, even in community samples.

3.3. PROACTIVE AND REACTIVE AGGRESSION

The current studies will also focus on aggressive behaviour (self-reported) as an outcome to evaluate the role of psychopathy using a validated psychopathy instrument (Youth Psychopathy Inventory: YPI), in relation to the FFM traits and the PSPT. Aggressive behaviour is a significant problem, with higher level aggressive behaviours serving to act as a risk factor for future violent behaviour (G. T. Harris & Rice, 1997). Aggression has been associated with FFM traits (typically, low A and low C), and is seen in psychopathy – however, the distinction in types of aggression in psychopathy seem to be key. Specifically, primary and secondary psychopathy appear to be differentially related to proactive and reactive aggression, respectively (Kimonis et al., 2011; Skeem et al., 2007). Focusing on proactive and reactive aggressive behaviour in the following studies will be also informative for identifying the PSPT scale's ability to measure psychopathic traits and predict psychopathy-related outcomes.

3.3.1. *Reactive aggression*

Aggressive behaviour that is *reactive* typically occurs as a reaction to perceived threat and is associated with anger (Polman, Orobio De Castro, Koops, Van Boxtel, & Merk, 2007). One

theory proposes that a person's frustration in response to a given situation can result in the experience of hostility and anger (Blair, 2010). These feelings increase negative emotions and make a person more likely to act aggressively as a consequence; the frustration-aggression model (e.g. Berkowitz, 1989). Blair (2010) suggested that individuals with psychopathic traits are particularly prone to frustration due to deficits in stimulus-reinforcement learning. A recent meta-analysis by Blais and colleagues showed that secondary psychopathic traits, especially the antisocial facet, were more strongly related to reactive aggression than were primary psychopathic traits (Blais, Solodukhin, & Forth, 2014).

3.3.2. Proactive aggression

In comparison to reactive aggression, proactive or instrumental aggression is not a direct response to frustration but rather is a planned behaviour with the aim to achieve goals beyond merely harming the other organism/individual (Polman et al., 2007). Specifically, proactive aggression involves the use of aggressive behaviour in order to gain some other reward, for example threatening to harm someone in order to obtain money. It has been suggested that proactive aggression is learned through social contexts, i.e. social learning (Bandura, 1983), through direct and vicarious reinforcement. Generally, aggressive behaviour is associated with negative outcomes. However, children who are proactively aggressive anticipate relatively positive outcomes arising from this behaviour (Dodge, Lochman, Harnish, Bates, & Pettit, 1997). This suggests that they have learnt that this way of behaving can, at least in some circumstances, help them to achieve their goals. Research shows that amongst offenders, crimes committed by psychopathic individuals commonly are proactive and reactive in nature (Chase, O'Leary, & Heyman, 2001; Cornell et al., 1996) and the proactive form of aggression is more strongly associated with Factor 1 of psychopathy,

especially the *Interpersonal* factor (Blais et al., 2014; Porter & Woodworth, 2006).

Interpersonal psychopathic traits include manipulation, lying and dishonest charm (see Table 1.1) and are presumably necessary and will facilitate the execution of planned and instrumental aggressive behaviour.

3.3.3. Proactive and reactive aggression and the FFM

Research suggests that personality traits, other than psychopathic traits, also play an important role in aggression. Within the FFM of personality framework, aggression is strongly related to Agreeableness (A) and Conscientiousness (C) in adults (Miller, Zeichner, & Wilson, 2012). Individuals low in A are distrusting, antagonistic and feel less empathy for others and are more likely to use both proactive and reactive aggression (Miller et al., 2012). C is related to self-discipline and deliberation. Low levels of these sub-traits make an individual more prone to use aggressive behaviour when frustrated, for instance when wanting something that is being denied (Jensen-Campbell, Knack, Waldrip, & Campbell, 2007). In fact, both low A and low C are also associated with psychopathy, and as psychopathy is a strong predictor of aggression, the link with A and C may explain the robustness of this association (Miller et al., 2012).

Neuroticism (N) also plays a role in aggression. The link between N and aggression is such that high N is associated with reactive aggression whereas low N is related to proactive aggression (Miller & Lynam, 2006). Individuals with high N are more emotionally unstable and more likely to have a bias towards negative emotions. They tend to interpret situations as more threatening or provocative than they really are; as seen in the hostile attribution bias (Dodge, 2006; Lawrence & Hodgkins, 2009). Therefore frustration and subsequent

reactive aggression are more likely to occur in individuals with high levels of N compared to individuals with lower levels of N.

Within the adolescent psychopathy literature evidence suggests that psychopathic traits are associated with higher levels of aggression, violence and offending behaviour (Campbell, Porter, & Santor, 2004; Vincent, Vitacco, Grisso, & Corrado, 2003). Kimonis and colleagues investigated adolescent male offenders, differentiating between primary and secondary variants of psychopathy. Already in this adolescent sample they found individuals with secondary psychopathic traits to be more hostile and depressed, with higher levels of distress and a higher likelihood of having a history of abuse (Kimonis et al., 2011), indicative of high N. Compared to individuals with primary psychopathic traits, those with higher secondary psychopathic traits were more reactively violent. Individuals with primary psychopathic traits tended to show a higher degree of proactive aggression in their study.

3.3.4. The current studies

In summary, current literature suggests that the type of aggression is differentially related to primary and secondary psychopathic traits. Therefore, reactive and proactive aggressive traits are useful constructs with which to examine the role of the FFM traits as indices of psychopathy. Similarly, measures of alcohol use can be useful for examining differences between primary and secondary psychopathic traits as demonstrated by Smith and Newman (1990). What is important is to compare these FFM-based personality measures to a validated measure of psychopathy. By doing this, our understanding of the standard FFM personality scales as well as the PSPT scales' ability to predict psychopathy-related outcomes will be extended, together with an examination of the extent to which the PSPT scales add

scientific value to existing measure of psychopathy. This will be done with adolescents in Study 2.

Adolescence is however a period of great change. The traits that impact behaviour in this developmental stage may not be the same further on in development. Therefore in Study 3, we will extend the research to young adults in order to investigate the extent to which the predictions found for the FFM personality based measures as well as the validated psychopathy measure of aggression and alcohol use remain or differ later on in development.

To do this, the following two studies will employ the Youth Psychopathy Inventory (YPI: Andershed et al., 2002). The YPI is a well-validated and reliable psychopathy assessment (Skeem & Cauffman, 2003). It is a dimensional self-report measure designed to identify psychopathic traits in adolescents and young adults. The YPI has a three-factor structure that examines 10 sub-facets of psychopathy and consists of 50 items. In terms of the three main factors of the YPI, the *Interpersonal* (e.g. *manipulation of others, lying*) and the *Callous/Unemotional* (e.g. *lack of empathy, remorselessness*) factors fit in with the characteristics of primary psychopathy or Factor 1 of psychopathy. The third factor, *Lifestyle* (e.g. *thrill-seeking, irresponsibility*) relates to the secondary psychopathy construct, or Factor 2 of psychopathy. Research shows that the YPI higher-order factors are also moderately correlated with the Psychopathy Checklist: Youth Version (PCL:YV) factors: interpersonal, affective and behavioural (Andershed et al., 2007). Because the YPI has mainly been used and validated in adolescent and young adult samples (>21) the young adult samples used in Study 3 and subsequent studies were age restricted (≤ 21).

3.4. STUDY 2

The aims of Study 2 are (i) to examine to what extent the standard FFM personality traits are related to aggression and alcohol use in adolescence, (ii) to test if the standard FFM personality traits or the proxy psychopathy measure – the PSPT scales – add predictive value above and beyond psychopathic traits as measured by the YPI (Andershed et al., 2002), in predicting alcohol use and aggression. This is done in order to evaluate the value of the PSPT scales in the context of psychopathy and psychopathy-related outcomes and whether the PSPT scales can stretch beyond the capabilities of the standalone FFM personality traits in predicting reactive and proactive aggression and alcohol use. This would mean that the PSPT scales could be used as proxy measure of psychopathic-like traits in cases where other psychopathy measures are unavailable, such as in large birth-cohort studies.

In the current study, the aims addressed above will be investigated in a sample of 14-year-old adolescents. This age group is examined here for consistency with the age group investigated in Study 1. To further develop the analysis of psychopathy and the FFM, the use of aggression as an additional outcome measure to distinguish between primary and secondary psychopathy, and a validated psychopathy measure (the YPI) suitable for adolescents have been added.

Research using the YPI found that the YPI higher-order factors (*Interpersonal, CU, Lifestyle*) were positively associated with both proactive and reactive aggression (Borrioni, Somma, Andershed, Maffei, & Fossati, 2014; Lynam, 2010). However, the factors related to primary psychopathy (*CU* and *Interpersonal* factors) were associated more strongly with proactive aggression than reactive aggression (Borrioni et al., 2014). In addition, to assess the relationship between CU traits and aggression, Essau and colleagues assessed how CU traits

were related to FFM personality traits as well as how FFM personality traits were related to aggression in adolescent boys and girls (Essau, Sasagawa, & Frick, 2006). They found that irrespective of sex, low C as well as high E and high N were associated with aggression. Low A was associated with aggression only in boys, and no longer predicted aggression when psychopathic traits were added to the model.

It is therefore hypothesised that low C and high E will be associated with both proactive and reactive aggression. In line with Miller and Lynam (2006), it is predicted that high N will be associated with increased reactive aggression and low N with increased proactive aggression. For psychopathic traits it is hypothesised that the factors relating to primary psychopathy, i.e. YPI *CU* factor, the YPI *Interpersonal* factor and the PSPT primary scale, will be associated with both reactive and proactive aggression but the link should be stronger for proactive aggression (Lynam, 2010). Higher scores on the *Lifestyle* factor of the YPI and the PSPT secondary scale are expected to be associated with reactive and proactive aggression but more strongly related to reactive aggression (Borrioni et al., 2014; Lynam, 1997).

In the literature on adolescent alcohol use and motives for drinking, associations are found for low A and, to a lesser extent, low C and high O (Kuntsche et al., 2006; Loukas et al., 2000; Markey, Markey, & Tinsley, 2003). With these findings and those from Study 1 it is predicted that lifetime alcohol consumption in the current study will be related to low A, low C and high E. In terms of psychopathic traits it is hypothesised that the *CU* and *Interpersonal* factors of the YPI and the PSPT primary scale will be related less strongly to alcohol use, whereas the *Lifestyle* factor of the YPI and the PSPT secondary scale will be good predictors of alcohol use.

3.4.1. Method for Study 2

3.4.1.1. Participants

A community sample of Year 9 adolescents (N=97, 54 females, M= 13.42 years, age range 13-15) was recruited from four British state secondary schools. Participants were recruited via two separate routes: Families were contacted through (i) schools directly; and (ii) the University of Nottingham School of Psychology Human Development and Learning (HDL) database, seeking consent from the parents and assent from the adolescents to take part in this study.

(i) School procedure: 12 Nottingham schools and 83 schools across England and Wales were contacted via e-mail with information about the study and asked for their assistance to contact parents of adolescents. For local schools, according to schools' preferences they were sent parent/adolescent information sheets to be forwarded via email or letter to the parents. The study was also introduced to one local school via a school assembly where parent contact details were retrieved. These parents were sent information packs via e-mail or letter to their home directly. All parents and adolescents who agreed to take part required the parents to give consent online via a link sent in the e-mail/letter. Once consent was given, a second e-mail was sent with the link to access the online questionnaires (using Survey-Monkey). Where schools preferred an opt-out method, adolescents carried out the survey individually during their Information Technology (IT) classes at school.

(ii) HDL database: Parents of adolescents were contacted via e-mail with information about the study and were invited to discuss the study with their child. For parents and adolescents who agreed to take part, the same procedure as described above applied - parents were

asked to give consent online. Once consent was given a second e-mail was sent with the link for the adolescent to access the online questionnaires.

3.4.1.2. Measures

As well as general demographic questions (age, sex, nationality) participants completed four questionnaires listed below.

NEO-Five-Factor Inventory (NEO-FFI: Costa & McCrae, 1992a). For details see Chapter 2 (section 2.2.2. Measures).

Primary and Secondary Psychopathic Traits Scale (PSPT: Heym/Schwartz, in subm.). For details see Chapter 2 (section 2.2.2. Measures).

Youth Psychopathy Inventory (YPI: Andershed et al., 2002). This 50-item dimensional self-report scale measures 10 core facets of psychopathy, with 5 items per facet and is based on a three-factor structure: The *Interpersonal* factor, the *CU* factor and the *Lifestyle* factor (see *Appendix 3.1.*). Table 3.1 below lists each higher-order YPI factor and their lower-order facets. Responses were given on a 4-point Likert-scale (1= 'does not apply at all', 2= 'does not apply well', 3= 'applies fairly well', 4= 'applies very well').

Reactive-Proactive Aggression questionnaire (RPQ: Raine et al., 2006). This 23 item scale assesses proactive (12 items) and reactive (11 items) aggression on a three-point Likert-scale (1= 'never', 2= 'sometimes', 3= 'often'; see *Appendix 3.2.*). Items assessing proactive aggression include items such as “How often have you used physical force to get others to do what you want”. Items for reactive aggression for example assess “How often have you damaged things because you felt mad”. The RPQ has been found to be valid and reliable (Raine et al., 2006).

Table 3.1 Youth Psychopathy Inventory higher-order and lower-order factors

YPI higher-order	YPI lower-order	Item examples
<i>Interpersonal</i>	Dishonest charm	When I need to, I use my smile and my charm to use others.
	Grandiosity	I'm better than everyone on almost everything.
	Lying	Sometimes I find myself lying without any particular reason.
	Manipulation	To get people to do what I want, I often find it efficient to con them.
<i>Callous/ Unemotional</i>	Callousness	I think that crying is a sign of weakness, even if no one sees you.
	Unemotionality	I usually feel calm when other people are scared.
	Remorselessness	I seldom regret things I do, even if other people feel that they are wrong.
	Irresponsibility	I have often been late to work or classes in school.
<i>Lifestyle</i>	Impulsiveness	It often happens that I talk first and think later.
	Thrill seeking	I like to do exciting and dangerous things, even if it is forbidden or illegal.

Alcohol Use Disorders Identification Test (AUDIT: Babor et al., 1992). This measure comprises 10 items that assess alcohol intake in general and specifically in the last year (see Appendix 3.3.). The AUDIT is divided into three sections: frequency of drinking, dependence symptoms and harmful alcohol use. The scale has shown to have good reliability amongst patient and community samples (Babor et al., 1991).

We revised the AUDIT to make it more appropriate for the use by adolescents. For instance, alcohol consumption is measured in alcohol units. To make this more comprehensive, examples assisting calculations of alcohol to units were provided (i.e. 1 or 2 units of alcohol are equal to 1 pint of beer or up to 2 glasses of wine/alco-pops). One item was excluded because of ethical considerations to ensure that participants did not perceive the behaviour described in the scale as normal ('How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?'). The questionnaire can be found in *Appendix 3.4.*

3.4.1.3. Procedure

Pupils were asked to complete materials online. Participants could access the survey via a SurveyMonkey link sent to the parents' email address or given to them by a teacher during an IT class. When participants logged onto the SurveyMonkey site, they were taken to their own unique response page. For each questionnaire, participants were told to respond to all items and to be accurate and honest. They were further informed that all information they gave would be confidential and anonymous and for their efforts they would be entered into a prize-draw with a chance of winning a £50 Amazon voucher. Participants had to email the researcher with the words 'prize-draw' in order to be entered into the draw. This ensured that participants' data were completely separate from their contact details. Information sheets, consent forms and debrief form can be found in *Appendix 3.5*.

3.4.2. Results for Study 2

The aim of Study 2 was to investigate to what extent the standard FFM personality traits, psychopathic traits measured by the YPI and the FFM based PSPT were related to aggression and alcohol use. Secondly, the study aimed to examine whether the PSPT scales or the FFM traits added incremental value above and beyond the YPI factors in predicting aggression and alcohol use. Means and SDs for the YPI scale, PSPT scales and NEO-FFI are detailed below (Table 3.2). In addition, internal reliability of subscales are shown in Table 3.2.

All scales reached acceptable or good reliability with the exception of two facets of the YPI: *Unemotionality* and *Callousness*, and Openness and Extraversion from the NEO-FFI. Results should be considered with this in mind. In terms of alcohol consumption, 23 participants indicated previous alcohol use and 64 had never consumed alcohol (there were missing data from 10 participants).

Table 3.2 YPI score range of participants

Variables	M	SD	α
<i>YPI – lower-order factors</i>			
<i>Dishonest charm</i>	2.04	.69	.86
<i>Grandiosity</i>	2.08	.72	.84
<i>Lying</i>	2.14	.67	.77
<i>Manipulation</i>	2.02	.66	.81
<i>Remorselessness</i>	2.07	.61	.69
<i>Unemotionality</i>	2.13	.57	.61
<i>Callousness</i>	2.02	.52	.47
<i>Thrill seeking</i>	2.58	.60	.71
<i>Impulsiveness</i>	2.29	.59	.68
<i>Irresponsibility</i>	1.86	.65	.80
<i>YPI – higher-order factors</i>			
Interpersonal	2.07	.57	.92
Callous/unemotional	2.07	.46	.78
Lifestyle	2.24	.53	.88
<i>PSPT</i>			
Primary	1.98	.41	.64
Secondary	1.82	.50	.65
<i>NEO-FFI</i>			
N	2.04	.63	.79
E	2.35	.57	.66
O	1.97	.41	.57
A	2.35	.49	.72
C	2.35	.65	.78
<i>RPQ</i>			
reactive	.86	.48	.90
proactive	.31	.39	.91

Note. YPI= Youth Psychopathy Inventory; PSPT= Primary and Secondary Psychopathy Traits; NEO-FFI= NEO-Five Factor Inventory; RPQ= Reactive and Proactive Aggression Questionnaire.

Correlations were computed for the three YPI higher-order factors and the FFM personality traits as well as PSPT factors and are shown in *Table 3.3*. A was negatively correlated with all three psychopathy factors. C was negatively and N positively correlated with *Lifestyle*. The PSPT secondary scale was positively correlated only with *Lifestyle* as was predicted. PSPT

primary traits were not significantly correlated with the YPI factors, although they were marginally positively correlated with the *CU* factor.

Table 3.3 Correlations between YPI factors and FFM personality traits and PSPT factors

	<i>Interpersonal</i>	<i>CU</i>	<i>Lifestyle</i>
FFM traits			
N	.09	-.01	.36**
E	-.05	-.12	-.10
O	.04	-.16	-.14
A	-.33**	-.36**	-.41**
C	-.02	-.17	-.43**
PSPT			
Primary	.06	.19^	-.14
Secondary	.03	.18	.26**

Note. Values in *italics* are Spearman's rho correlations; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness.

* $p < .05$, ** $p < .01$, ^ $p = .065$.

3.4.2.1. Aggression

In order to look at the relationship between aggression and personality traits we first examined Pearson's r coefficients and Spearman's rho coefficients for normal and non-normally distributed data, respectively, between FFM traits, PSPT and YPI factors and reactive and proactive aggression. The correlation coefficients are shown in Table 3.4. All YPI factors were significantly positively correlated to both reactive and proactive aggression. For the PSPT scales, only the secondary psychopathic-like traits were significantly positively correlated with both forms of aggression. Amongst the FFM personality traits, A had the strongest relationship with both types of aggression, followed by C; both showing negative associations.

Table 3.4 Correlation coefficients for YPI factors, FFM traits and PSPT with aggression

	Reactive aggression	Proactive aggression
YPI factors		
<i>Interpersonal</i>	.32**	.40**
<i>CU</i>	.40**	.48**
<i>Lifestyle</i>	.60**	.50**
FFM personality traits		
N	.45**	.15
E	-.28*	-.29*
O	-.04	-.07
A	-.49**	-.49**
C	-.38**	-.36**
PSPT		
Primary	-.20	-.04
Secondary	.37**	.27*

Note. Spearman's Rho coefficients in *italics*; YPI= Youth Psychopathy Inventory; FFM= Five Factor Model; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness.

* $p < .05$, ** $p < .01$.

N was strongly and positively correlated with reactive aggression. E was significantly negatively correlated with both types of aggression but this relationship was numerically weaker than the other FFM traits.

To test the extent to which FFM personality traits, YPI higher-order factors and PSPT predict aggression, two sets of linear regressions were conducted with reactive and proactive aggression as outcome variables (see Table 3.5). In the first model the standard FFM personality traits that were significantly correlated with proactive, then reactive aggression were entered simultaneously as predictor variables. The analyses showed that low A was found to predict both types of aggression. Low C was also found to predict aggression, but only reactive aggression.

For Model 2, using the YPI factors, it was found that the *CU* factor predicted proactive aggression whereas the *Lifestyle* factor predicted reactive aggression. This model explained more of the variance than the model using FFM personality traits and PSPT as predictors of aggression.

In Model 3, the primary and secondary PSPT factors were simultaneously entered as predictors of proactive and reactive aggression. Primary psychopathic-like traits were significantly associated with reactive aggression. Individuals with higher PSPT primary traits were less likely to be reactively aggressive. The opposite pattern was found for secondary

Table 3.5 Linear regression analyses with aggression as outcome variables in three models

Model 1	Reactive			Proactive		
	B	SE B	β	B	SE B	β
N	.13	.08	.18	-	-	-
A	-.30**	.11	-.31	-.20*	.09	-.25
C	-.17*	.07	-.24	-.10	.06	-.16
E	-.01	.09	-.01	-.12	.08	-.17
Adjusted R ²	.29			.17		
F change in R	9.78***			6.99***		
Model 2						
<i>Interpersonal</i>	-.13	.11	-.15	.09	.093	.13
<i>CU</i>	.13	.14	.12	.30*	.12	.34
<i>Lifestyle</i>	.54**	.11	.61	.13	.09	.17
Adjusted R ²	.34			.30		
F change in R	16.14***			13.59***		
Model 3						
PSPT Primary	-.24*	.11	-.21	.10	.10	.10
PSPT Secondary	.38***	.09	.41	.16^	.08	.21
Adjusted R ²	.16			.04		
F change in R	9.38***			2.73		

Note. Neuroticism; E= Extraversion; A= Agreeableness; C= Conscientiousness; CU= Callous/Unemotional; PSPT= Primary and Secondary Psychopathic Traits

* $p < .05$, ** $p < .01$, *** $p < .001$, ^ $p = .054$.

psychopathic-like traits, showing that increased secondary psychopathic-like traits were associated with more reactive aggression. The relationship between secondary psychopathic-like traits and proactive aggression was marginally significant ($p = .054$),

indicating that increased levels of secondary psychopathic-like traits were related to increased levels of proactive aggression.

In order to examine if the standard FFM personality traits and PSPT scale added predictive value above and beyond the YPI factors in predicting aggression, hierarchical regression analyses were conducted with the YPI factors entered simultaneously in the first step. In Model 1, the FFM personality traits were entered in the second step. In Model 2, the PSPT primary and secondary factors were entered in the step 2. The results of these models are shown in Table 3.6. for reactive aggression and Table 3.7. for proactive aggression.

Table 3.6 Hierarchical regression models with reactive aggression as outcome variable

	REACTIVE	B	SE B	β
Model 1	<i>Interpersonal</i>	-.13	.11	-.15
	<i>CU</i>	.13	.14	.12
Step 1	<i>Lifestyle</i>	.54***	.11	.61
	Adjusted R^2	.34		
	F for change in R	16.14***		
Step 2	<i>Interpersonal</i>	-.09	.11	-.11
	<i>CU</i>	.12	.14	.12
	<i>Lifestyle</i>	.39***	.12	.44
	N	.11	.08	.14
	E	-.08	.08	-.09
	A	-.15	.11	-.15
	C	-.05	.08	-.07
	Adjusted R^2	.41		
	F for change in R	3.38**		
Model 2	<i>Interpersonal</i>	-.06	.11	-.07
	<i>CU</i>	.13	.14	.12
Step 2	<i>Lifestyle</i>	.43**	.11	.48
	PSPT Primary	-.15	.10	-.13
	PSPT Secondary	.24*	.09	.25
	Adjusted R^2	.39		
	F for change in R	4.13*		

Note. CU= Callous/Unemotional; N= Neuroticism; E= Extraversion; A= Agreeableness; C= Conscientiousness; PSPT= Primary and Secondary Psychopathic Traits.

* $p < .05$, ** $p < .01$, *** $p < .001$.

In Model 1 and 2, reactive aggression was used as the outcome measure. In step 1 of model 1 and 2, the *Lifestyle* factor of the YPI significantly predicted reactive aggression ($p<.001$). In model 1, adding the FFM personality traits in step 2 showed that none of the FFM traits were significantly related to reactive aggression. Step 2 added significantly to the explained variance of the model (F for change in $R = p<.01$). However, the YPI *Lifestyle* factor remained the only significant predictor of reactive aggression. In model 2, the PSPT primary and secondary factors significantly added to the explained variance in step 2 (F for change in $R = p<.05$). The PSPT secondary factor also significantly predicted reactive aggression ($p<.05$).

Table 3.7 Hierarchical regression models with proactive aggression as outcome variable

	PROACTIVE	B	SE B	β
Model 3	<i>Interpersonal</i>	.09	.09	.13
	<i>CU</i>	.30**	.12	.34
Step 1	<i>Lifestyle</i>	.13	.09	.17
	Adjusted R^2	.30		
	F for change in R	13.59***		
Step 2	<i>Interpersonal</i>	.16	.10	.23
	<i>CU</i>	.26**	.12	.29
	<i>Lifestyle</i>	.03	.10	.05
	E	-.16**	.07	-.23
	A	-.01	.09	-.02
	C	-.09	.06	-.15
	Adjusted R^2	.37		
	F for change in R	4.14**		
Model 4	<i>Interpersonal</i>	.11	.10	.16
	<i>CU</i>	.26*	.12	.29
Step 2	<i>Lifestyle</i>	.12	.10	.17
	PSPT Primary	.10	.09	.10
	PSPT Secondary	.09	.08	.11
	Adjusted R^2	.31		
	F for change in R	1.57		

Note. CU= Callous/Unemotional; E= Extraversion; A= Agreeableness; C= Conscientiousness; PSPT= Primary and Secondary Psychopathic Traits.

* $p<.05$, ** $p<.01$, *** $p<.001$.

Proactive aggression was used as outcome measure in Model 3 and 4. In step 1 of these two models the *Callous/Unemotional* factor of the YPI significantly predicted proactive

aggression ($p < .01$). Model 3, with FFM traits as predictors in step 2, added significantly to the variance explained (F for change in $R = p < .01$). Low E predicted more proactive aggression in this model. The PSPT factors in model 4 did not add predictive value above and beyond the YPI higher-order factors in the second step.

3.4.2.2. *Alcohol use*

For alcohol use, a total score was calculated by summing the individual scores for each item of the AUDIT. Linear regressions were computed to examine the extent to which the FFM personality traits, YPI factors and PSPT factors predicted alcohol use. However, the residuals of these models were not normally distributed. This was most likely due to the data being positively skewed. Whereas the median total score was 3, two participants scored extremely high (total scores = 35 and 29) and most participants ($N=64$) scored 0 on the AUDIT.

Therefore the alcohol use measure was categorised into “never consumed alcohol” versus “had previously consumed alcohol”.

Three logistic regression models were computed with the categorical alcohol use variable as outcome. Correlation analyses were not computed for these data due to alcohol use being categorical. Therefore all FFM personality traits as well as all YPI factor and PSPT traits were included in the analyses. The first model included the FFM traits as predictors. Model 2 was computed with the *Interpersonal*, *Callous/Unemotional* and *Lifestyle* factor of the YPI as predictors. The last model included the PSPT factors as predictors of alcohol use. The results are shown in Table 3.8.

Out of the three models, only the model including standard FFM personality traits was significant, indicating that lower A increased the likelihood of being part of the alcohol

consuming group. Neither the YPI factors nor the PSPT primary or secondary scale were predictive of alcohol use.

Table 3.8 Logistic regression models with lifetime alcohol use as categorical outcome

			95% CI for Odds Ratio		
Model	B	SE B	Lower	Odds Ratio	Upper
Model 1 - FFM					
Constant	4.64	2.66		.08	
N	-.41	.50	.25	.67	1.78
E	-.47	.54	.22	.63	1.81
O	.23	.67	.34	1.25	4.64
A	-1.65*	.69	.05	.19	.73
C	-.16	.44	.36	.86	2.01
R ² = .13 (Cox&Snell), .19 (Nagelkerke). Model X ² (5)=11.95, <i>p</i> <.05. <i>p</i> =.02					
Model 2 - YPI					
Constant	.76	1.46		.01	
<i>YPI Interpersonal</i>	.23	.66	.35	1.26	4.59
<i>YPI CU</i>	.40	.86	.28	1.50	8.00
<i>YPI Lifestyle</i>	.76	.65	.59	2.13	7.66
R ² = .06 (Cox&Snell), .09 (Nagelkerke). Model X ² (3)= 5.33, <i>p</i> <.15.					
Model 3 - PSPT					
Constant	-.99	1.42		.37	
<i>PSPT primary</i>	-.71	.61	.15	.49	1.62
<i>PSPT secondary</i>	.74	.51	.78	2.10	5.71
R ² = .04 (Cox&Snell), .05 (Nagelkerke). Model X ² (2)= 3.18, <i>p</i> <.20.					
<i>Note.</i> FFM= Five-Factor Model; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness; YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional; PSPT= Primary and Secondary Psychopathic Traits scale					

3.4.3. Summary for Study 2

Study 2 examined the extent to which FFM personality traits and the proxy psychopathy measure, the PSPT scale, could predict alcohol use as well as aggression in adolescence and

to compare the effectiveness of the FFM traits and PSPT scale in predicting these outcomes with a validated measure of psychopathy, the Youth Psychopathy Inventory. This was done because, at present, the validity of the PSPT scale still needs to be explored to see how useful the scale is in comparison to the standard FFM personality traits in predicting psychopathy-related outcomes.

If the PSPT factors are similar to the YPI higher-order factors, then the respective factors should show moderate to strong correlations. This is not to say that if two constructs correlate it follows that they measure exactly the same construct (i.e. Conscientiousness is correlated with psychopathy but in itself does not index psychopathy). However, it would indicate a relationship between the two and is a good starting point for comparing the PSPT and YPI. In this sample, the PSPT secondary scale was correlated with the YPI *Lifestyle* factor, both of which are thought to index secondary psychopathic traits. However, the effect size for this relationship was small ($r=.26$). Therefore, although the *Lifestyle* factor and the PSPT secondary factor seem to be linked to some extent, it is possible that these two psychopathy factors do not measure the same construct, especially given the small correlation coefficient. For instance, the PSPT secondary factor includes items of N which measure emotional reactivity. This aspect is not part of the YPI *Lifestyle* factor. Here the focus is put on impulsivity, irresponsibility and thrill-seeking.

The PSPT primary factor was not correlated with either of the YPI factors that index primary psychopathic traits. This was surprising as it was hypothesised that the primary PSPT factor would be associated with at least one of the YPI factors. Of the PSPT primary items half of the items measure anxiety, or rather the absence of anxiety (N). However, only one item taps into callousness and grandiosity. The YPI *Interpersonal* and *CU* factors assess the latter

two aspects but do not measure fearlessness or low anxiety. Their primary focus is meanness (i.e. lack of empathy). This could explain why the relationship between the YPI factors and the primary PSPT factor is weak.

One of the difficulties in researching psychopathy is that assessments of the construct differ between measures, mainly because there are different perspectives within the literature regarding the factors constituting psychopathy. Some of these perspectives have already been touched upon in Chapter 1 (section 1.2) regarding a three or four factor structure including an interpersonal factor (e.g. superficial charm), a callous/unemotional factor (e.g. lack of guilt), a lifestyle factor (e.g. irresponsible) and an antisocial factor (e.g. deviant behaviour). However, another way to conceptualise psychopathy that helps to demonstrate the differences in psychopathy measures is through Patrick's triarchic conceptualisation of psychopathy (Patrick, Fowles, & Krueger, 2009), which suggests three factors. The first factor, Disinhibition is similar to the *Lifestyle* factor and includes impulsive and reckless behaviour. The second factor, Meanness, includes lack of empathy and overlaps with the *Callous/Unemotional* factor. The last factor is Boldness. Boldness describes characteristics such as social dominance, low stress-reactivity and thrill-seeking and it is this last factor that is not focused upon as intensely within some of the most used psychopathy measures such as the Psychopathic Checklist-Revised (PCL-R: Hare et al., 1991). The PSPT scales on the other hand does include items measuring Boldness (e.g. "When I'm under a great deal of stress, sometimes I feel like I'm going to pieces." (r); "I often feel inferior to others." (r)). However, the PSPT does not focus as much on the Meanness component as do the PCL-R or the YPI. This limits the range of traits the PSPT scales can measure and ultimately limits their ability in capturing the entirety of the psychopathy construct. It would therefore be beneficial to integrate items assessing Meanness into the PSPT scales and examine how this

would change the scales' capability of measuring psychopathic traits compared to other validated psychopathy measures.

3.4.3.1. *Aggression*

Aggressive behaviour is both actively and indirectly destructive to other individuals and society as a whole. Psychopathy and related personality traits have been found to be good predictors of aggression with research suggesting the existence of different associations for proactive and reactive aggressive behaviour (Lynam, 1997). In line with previous research the findings of the current study suggest a strong association between psychopathic traits and aggression as well as low A and aggression.

Specifically, all YPI higher-order factors were predictive of reactive aggression, with the strongest association found for the YPI *Lifestyle* factor (secondary psychopathy). It is thought that this link exists because individuals with secondary psychopathic traits are typically more emotionally unstable than individuals with primary psychopathic traits (Hicks et al., 2004). They have increased levels of anger, hostility and impulsivity which, in turn, are linked to heightened levels of reactive aggression (Lawrence, 2006).

Primary psychopathic traits are often found to be strongly related to proactive aggression and reactive aggression and as indicated in this study, amongst the psychopathy-related factors of the YPI and PSPT, the YPI *CU* factor was the only predictor of proactive aggression. In this sample the YPI *CU* and *Interpersonal* factors were also predictive of reactive aggression which is in line with the general finding showing a link between psychopathy and aggression (Borrioni et al., 2014; Lynam, 2010). However, Kimonis and colleagues (2011) found that in an offender sample, primary psychopathic traits were more strongly related to proactive aggression and secondary psychopathic traits were more strongly related with

reactive aggression. Perhaps such distinctions are possible in forensic samples and are less likely to be observed in relatively young, community samples. Also, the link between psychopathic-like traits and the different types of aggression may become more pronounced later in development within the normal population.

The findings for the FFM personality traits show important links with aggression. Proactive aggression was related to low C, low A, average levels of N and low E. Reactive aggression on the other hand was associated with a profile of high N, low C, low A and low E. These profiles correspond to primary and secondary psychopathy respectively, with N being the distinguishing factor. This was also demonstrated here whereby individuals scoring high on the *Lifestyle* factor also had higher levels of N whereas this relationship was not found for the *CU* and *Interpersonal* factors.

In comparison, the PSPT scales were not able to make a distinction between proactive and reactive aggression because the PSPT primary traits were found to be unrelated to both types of aggression and only the PSPT secondary factor showed a correlation with the proactive and reactive aggressive behaviour. These findings suggest that the PSPT scales are not as sensitive as the standard FFM personality traits in distinguishing aggressive psychopathy-related behaviour. It is therefore possible that using the standard FFM traits in relation to psychopathy-related outcomes is more meaningful than using the PSPT scales.

A comparison of the regression models (i.e. adjusted R^2) that examined the YPI higher-order factors, FFM personality traits and PSPT factors in predicting aggression demonstrated that the YPI factors showed the strongest link to aggression, followed by the FFM traits, with the PSPT scales showing the weakest associations. This suggests that personality traits based on the FFM contribute somewhat to the variance in explaining aggression, more than the PSPT

scales. However, psychopathic traits, as measured by the YPI, were most effective in predicting aggression.

It is possible that FFM traits or the PSPT add incremental predictive value above and beyond the YPI factors. This was tested and the findings showed that the secondary PSPT scale does in fact add predictive value above and beyond the YPI for reactive aggression. This suggests that the secondary PSPT scale measures aspects relevant to psychopathy-related outcomes that are not addressed by the YPI. However, the primary PSPT scale only showed a weak association with reactive aggression and no association with proactive aggression which may indicate issues in accurately indexing primary psychopathic traits.

The findings of this study further indicated that none of the FFM traits added predictive value above and beyond the YPI factors for reactive aggression. However, low E was found to explain additional variance in proactive aggression over and above the YPI. This is surprising given that there is only a small amount of research indicating a link between E and aggression. For instance, Pease & Lewis (2015) showed an inverse relationship between anger and E. Introverts seem to be less likely to be involved in stimulating interpersonal exchanges and therefore are less likely to be in situations involving reactive aggression, and may find emotional aggression overly stimulating. However, they may still be goal driven – and so may use aggression as a means to achieve aims.

In summary, aggression was best predicted by the psychopathy measure, the YPI. This was true for both types of aggression. The PSPT secondary scale added some incremental value in addition to the YPI in the prediction of reactive aggression, whereas the primary scale did not. Of the FFM traits, E added predictive value to explaining proactive aggression in addition to the YPI and the overall model fit was found to be better than for the PSPT.

3.4.3.2. *Alcohol*

Alcohol misuse can have severe consequences and is linked to psychopathy, in particular to secondary psychopathic traits (Kimonis, Tatar, et al., 2012; Neumann & Hare, 2008). It was therefore hypothesised that secondary psychopathic traits, measured by both the PSPT scale as well as the YPI, would show associations with alcohol use in this sample of adolescents. However, the YPI higher-order factors, *Interpersonal*, *Callous/Unemotional* and *Lifestyle*, as well as the two PSPT factors were not found to be related to alcohol use.

There was, however, one FFM personality factor, A, that predicted alcohol consumption, as was found in Study 2. Less agreeable individuals were more likely to have consumed alcohol by age 14. This is in line with previous research showing a consistent link between alcohol use and low A in adolescence (Kuntsche et al., 2006; Loukas et al., 2000; Markey et al., 2003). It was expected that C would also be related to alcohol use (Loukas et al., 2000; Markey et al., 2003). However, such a link was not found here.

3.4.3.3. *Limitations of Study 2*

There were a few constraints in this study that could have affected the results. The number of adolescents who, according to self-report, had never consumed alcohol was very high (66%). This means that the data had to be categorised into groups of adolescents who had never drunk and those who had, thus reducing the power of the analysis (Altman & Royston, 2006). Under some circumstances it can still be meaningful to split the data into groups of abstainers and alcohol drinkers. White and Hingson (2013) found that the risk of alcohol dependence was higher for those adolescents who started drinking earlier in development. Therefore looking at those individuals in this sample who had already tried alcohol compared to those who had not allowed us insight into individual differences. It seems that

low A played an important role in distinguishing those individuals who drank from those who did not at age 14. However, the findings from Study 1 were not entirely replicated, namely that high E and O as well as low C were also related to alcohol use. It could be that the same associations were not found in Study 2 because the sample was considerably smaller here. However, due to the considerable difficulties in recruiting the current sample as well as time constraints of this research, it was not possible to recruit a larger sample.

Next, the PSPT primary scale was not related to proactive aggression as was expected. It is noteworthy that within the normal population scores for aggression and particularly proactive aggression are never expected to be very high. Therefore examination of such behaviour is difficult not only because of social desirability bias issues but also because of potential restricted variability within the data.

In addition, a larger sample would inevitably increase financial costs because the NEO-FFI is purchased at a reasonably high price. Consequently, in order to investigate personality traits, especially in larger research projects, it would be more efficient to use freely available personality measures, such as the International Personality Item Pool (IPIP).

Finally, it is not clear how these findings translate to individuals in later adolescence or early adulthood. Mechanisms that are linked to problem behaviours such as excessive alcohol use or aggression change over time. Tucker and colleagues showed that binge drinking behaviour changed from age 13 to 23 with different clusters of individuals displaying different trajectories; e.g. a cluster of high binge drinkers in early adolescence decreased binge drinking behaviour over time or a cluster of individuals steadily increasing binge drinking behaviour from age 13 to 23 (Tucker, Orlando, & Ellickson, 2003). Additionally, in this study primary psychopathic traits were expected to be related to proactive aggression.

However this was not found. Perhaps this was due to the sample being a young community sample where the link between psychopathic traits and proactive aggression may not have been strong enough to be detected. Therefore in the next study we investigated whether psychopathic traits are predictive of risk-taking behaviours, i.e. alcohol use and aggression, in young adults (age range 17-21 years).

3.5. STUDY 3

To recap, the aims of Study 2 were to (i) investigate the extent to which FFM personality traits and the PSPT scales, could predict aggression and alcohol use in adolescents and (ii) compare the effectiveness of the FFM traits and PSPT scales in predicting these outcomes with a validated measure of psychopathy, the Youth Psychopathy Inventory (YPI). It was further examined if the PSPT scales could predict alcohol use and aggression better than the standard FFM personality traits. This was done in a sample of 14-year-old adolescents. The findings showed that although the PSPT was associated with aggression, these associations were not as strong and did not show the same kind of differentiation as did the FFM traits. The PSPT scales were also not significantly related to alcohol use whereas the FFM traits were. Therefore the PSPT was no longer included in this and any further studies. Instead, we examined the strength of the Big-Five personality traits in predicting alcohol use and aggression compared with the YPI.

Study 3 differs from Study 2 in that the population of interest is young adults. By examining this group, measures of alcohol use and aggressive behaviour are more likely to pick up more frequent expressed behaviours, and as such these behaviours are more likely to be identified because emerging adulthood is a stage in which the risk of developing alcohol dependence is high (Arnett, 2000; Chassin et al., 2004). There are also more experiences

with, and opportunity to engage in aggressive behaviours in this developmental stage compared to early adolescence, as individuals move away from the rules and governance of parents and negotiate conflicts with others as independent individuals. This study is therefore a meaningful extension to the research conducted so far and will identify similarities and differences in terms of risk factors of aggression and alcohol use across the two developmental stages.

3.5.1. FFM, psychopathy and alcohol use in adults

Typically in the adult literature, drinking behaviour is linked to FFM personality traits, specifically low A and C as well as high N (Malouff et al., 2007). Additionally, some findings also suggest high E to play a role in alcohol use (Booth et al., 2013; Hopwood et al., 2007).

As mentioned previously, the relationship of alcohol use and psychopathy in adulthood has been demonstrated previously (e.g. Neumann & Hare, 2008). However, whereas in Neumann and Hare's study the relationship between psychopathy and alcohol use was analysed using one superordinate psychopathy factor, earlier studies point to a specific association between alcohol use and secondary psychopathy (Hicks et al., 2004; Smith & Newman, 1990). Therefore we expect that in the current study, *Lifestyle* traits of the YPI will be associated with higher levels of alcohol use.

3.5.2. FFM traits, psychopathy and aggression in adults

Research on the link between aggressive behaviour and FFM personality traits in adults suggests that, like the predictors of alcohol use, low A and C, as well as high N are associated with reactive aggression (Miller et al., 2012). Low A and C are also found to be related to proactive aggression. Conversely to reactive aggression, proactive aggression is associated

with low N rather than high N (Miller & Lynam, 2006). Adults with psychopathic traits have been shown to engage in both reactive and proactive aggression (Porter & Woodworth, 2006). Individuals with secondary psychopathic traits exhibit reactive aggression due to frustration or biased threat perception (Falkenbach, Poythress, & Creevy, 2008; Lynam, 1997), high reactivity to stress (Hicks et al., 2004) and high levels of impulsivity (Patrick et al., 2009). Interestingly, reactive aggression is common amongst offenders, however, the exhibition of proactive aggression is more likely amongst psychopathic offenders (Cornell et al., 1996). Furthermore, Blais and colleagues found that the *Interpersonal* factor of psychopathy was most strongly related to proactive aggression (Blais et al., 2014). The current study examines the relationship between proactive and reactive aggression and psychopathic traits in a non-forensic sample. It is expected that higher psychopathic traits will be associated with both proactive and reactive aggression. The relationship with proactive aggression should be strongest for the YPI *Interpersonal* factor.

3.5.3. *Alternative measurement of the FFM of personality*

In the studies presented so far, normal personality traits were measured using the NEO-Five Factor Inventory (NEO-FFI: Costa & McCrae, 1992c). However, as previously mentioned, this measure is costly and there are other valid and equivalent measures of personality such as the International Personality Item Pool (IPIP) Big-Five personality factor markers (Goldberg, 1992) which can be used for the same purpose. Comparing the 50-item IPIP Big-Five personality factor markers (IPIP50) with the NEO-FFI, Gow and colleagues found the two measures to be strongly correlated with each other and the internal consistency of the IPIP50 to be good (Gow, Whiteman, Pattie, & Deary, 2005). The IPIP50 therefore allows us to

measure personality traits at no financial cost. It is used in the following study for this reason.

3.5.4. Current study

This study's aim is (i) to examine how the findings from study 2 translate from early adolescence to young adulthood. It will be assessed how normal personality traits and psychopathic traits, as measured by the IPIP50 and YPI respectively, are associated with alcohol use and aggression in undergraduate students. However, it will have to be taken into account that the different personality measures used in study 2 and 3 limit the conclusions we can draw. (ii) Additionally, it is investigated whether the Big-Five personality traits can predict alcohol use and aggression above and beyond psychopathic traits. Comparisons can then be made between Study 2 and 3 in terms of personality traits that predict alcohol use and aggression in the different developmental stages.

It is expected that proactive and reactive aggression will be associated with low A and low C in line with previous research (Miller & Lynam, 2006). High N is expected to be associated with reactive aggression and low N is predicted to be related to proactive aggression (Miller & Lynam, 2006; Miller et al., 2012).

The higher-order YPI factors (*Interpersonal, Callous/Unemotional and Lifestyle*) are hypothesised to be related to proactive and reactive aggression. It is expected that proactive aggression would be especially associated with the YPI *Interpersonal* factor, in line with Blais' findings (2014). Secondary psychopathic traits, i.e. the YPI *Lifestyle* factor, was expected to be more strongly related to reactive aggression (Cornell et al., 1996; Porter & Woodworth, 2006).

In line with the literature alcohol use is hypothesised to be negatively associated with A, low C, high N and high E (Booth et al., 2013; Chassin et al., 2004; Malouff et al., 2007). In terms of psychopathic traits it is suggested that the YPI *Lifestyle* factor will be positively associated with alcohol use. The YPI *Interpersonal* and *Callous/Unemotional* (CU) factors are expected to be less related to drinking behaviour (Smith & Newman, 1990).

3.5.5. Method for Study 3

3.3.3.1. Participants

Undergraduate students were contacted via email through the departments of the University of Nottingham and the Personality Social Psychology and Health (PSPH) group participant pool. 178 participants responded to the invitation to take part in the survey (Information sheet, consent form and debrief form can be found in Appendix 3.7.). 119 participants fully completed the survey (71 females, M= 19.24 years, SD= .76).

3.3.3.2. Materials

The same information sheets and consent forms were used as in Study 2, except for parent consent which was not needed. Participants filled in the survey via the online survey website SurveyMonkey. All other information given to the participants regarding the survey were also exactly the same as in Study 2. The only change was that the NEO-FFI was replaced with the IPIP50.

International Personality Item Pool 50-item Big-Five personality factor markers (IPIP50 Goldberg, 1992). The questionnaire assesses Emotional stability (Neuroticism - reversed), Extraversion, Agreeableness, Conscientiousness and Intellect (i.e. Openness) with 10 items

each on a 5-point Likert scale (see *Appendix 3.6.* for full version). Internal consistency for these factors has been shown to be good (α s from .79 to .87; Goldberg, 1992).

3.3.3.3. Data Analysis

Examination of the outcome variables showed that proactive aggression was strongly positively skewed with most participants scoring zero. The variable was also restricted to a 3-point Likert scale. Therefore a categorical variable was computed for which participants with a total score of zero were categorised as being not proactively aggressive. Participants scoring above zero were categorised as indicating some proactive aggression. Logistic regression models were computed with proactive aggression as the dichotomous outcome variable and the IPIP and YPI factors as predictors.

Reactive aggression was also not normally distributed. Spearman's rho correlation coefficients were therefore used for both types of aggression. Reactive aggression raw scores were still used as outcome variable in linear regression models, as residuals were checked for normality and found to be normally distributed.

Alcohol use was calculated by summing the AUDIT items together to attain a total score. This measure was normally distributed.

3.3.4. Results for Study 3

The analyses within this study aimed to assess the relationship between normal and psychopathic personality traits and alcohol use and reactive aggression. Table 3.9. below shows mean scores for psychopathic traits, Big-Five personality factors, alcohol use and aggression. For proactive aggression, 64 participants were categorised as not proactively aggressive and 55 as proactively aggressive. All scales were internally reliable, although the

facet level scales 'Impulsiveness' and 'Thrill seeking' were slightly below optimal internal reliability. As the analyses were conducted on higher order factor levels, however, this was not considered to be a significant problem.

Table 3.9 Means, standard deviations and Cronbach's alphas for both predictor and outcome variables

	M	SD	α
<i>YPI – lower-order factors</i>			
Dishonest charm	2.17	.64	.83
Grandiosity	1.94	.61	.80
Lying	1.97	.65	.82
Manipulation	1.94	.65	.87
Remorselessness	1.77	.62	.80
Unemotionality	2.10	.55	.69
Callousness	1.81	.55	.72
Thrill seeking	2.55	.50	.64
Impulsiveness	2.22	.52	.66
Irresponsibility	1.77	.62	.72
<i>YPI – higher-order factors</i>			
Interpersonal	2.00	.51	.92
Callous/unemotional	1.89	.49	.87
Lifestyle	2.18	.44	.81
<i>NEO-FFI</i>			
N	2.09	.76	.88
E	2.07	.71	.88
O	2.65	.54	.79
A	2.81	.63	.87
C	2.44	.57	.79
<i>RPQ</i>			
reactive	.55	.37	.85
proactive	1.00	.20	.82
<i>AUDIT</i>			
Total	8.82	6.37	.78

Note. YPI= Youth Psychopathy Inventory; FFM= Five Factor Model; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness; RPQ= Reactive and Proactive Aggression Questionnaire; AUDIT= Alcohol Use Disorders Identification Test.

Correlations were conducted on the Big-Five personality traits and reactive aggression as well as alcohol use (see Table 3.10). Correlations for proactive aggression were not computed due to the categorical nature of the outcome variable. N was positively correlated

with reactive aggression and showed the highest correlation coefficient amongst all IPIP traits and psychopathic traits. A was negatively correlated with reactive aggression. The *Interpersonal* factor of the YPI was found to be positively correlated with reactive aggressive behaviour.

Alcohol use was most strongly related to YPI *Lifestyle* showing that participants with higher *Lifestyle* scores also showed increased alcohol use. The YPI *Interpersonal* factor was also significantly correlated with alcohol use. Whereas E was significantly positively related to AUDIT total scores C showed a negative relationship with AUDIT scores. Finally, N was found to be significantly positively related to alcohol use but this relationship was weak.

Table 3.10 Correlation coefficients for YPI and IPIP factors and reactive aggression as well as alcohol use

	Reactive aggression	AUDIT total
YPI factors:		
<i>Interpersonal</i>	.19**	.20**
<i>CU</i>	.10	.01
<i>Lifestyle</i>	.10	.49***
IPIP personality traits:		
N	.38***	.16^
E	-.06	.31***
O	-.10	.11
A	-.18*	.10
C	-.13	-.25***

Note. AUDIT= Alcohol Use Disorders Identification Test; YPI= Youth Psychopathy Inventory; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness; Spearman's rho in *italics*.

* $p=0.055$, ** $p<.05$, *** $p<.01$, ^ $p=.06$.

3.3.4.1. Aggression

To investigate the association between the Big-Five personality traits and reactive aggression a linear regression analysis was conducted with the IPIP factors that were significantly correlated with reactive aggression as predictors (N and A). These were entered simultaneously into the model. The analysis (Model 1) showed that low A and high N significantly predicted reactive aggression as seen in Table 3.11. The model explained 21% of the variation in reactive aggression.

Next, the relationship between reactive aggression and the YPI scale was assessed with the *Interpersonal*, *CU* and *Lifestyle* factors as predictor variables. Although not all YPI factors were significantly correlated with reactive aggression they were entered simultaneously into the model. This is because the ultimate aim was to assess how well the YPI scale as a whole could predict aggression and whether Big-Five personality traits could predict aggression above and beyond the YPI scale as a whole, rather than individual YPI factors. The results of this analysis (Model 2) showed that the YPI *Interpersonal* factor was significantly associated with reactive aggression, indicating that higher interpersonal traits were linked to higher reactive aggression (see Table 3.11). This second model explained 8% of the variation in reactive aggression, 11% less than Model 1.

In order to examine if the IPIP factors added predictive value above and beyond the YPI scale for reactive aggression, a hierarchical regression analysis was conducted with the YPI higher-order factors in step 1 and the IPIP factors N and A in step 2. As shown in Table 3.12, the model fit improved by adding the IPIP factors. The YPI higher-order factors initially explained 8% of the variation in reactive aggression but adding the IPIP factors in step 2

Table 3.11 Linear regressions with reactive aggression as outcome variable and IPIP factors (Model 1) and YPI factors (Model 2) as predictors

Reactive aggression			
Model 1	B	SE B	β
N	.17***	.04	-.36
A	-.20***	.05	-.30
Adjusted R^2	.21		
F for change in R	16.66***		
Model 2	B	SE B	β
<i>YPI Interpersonal</i>	.21*	.10	.28
<i>YPI CU</i>	.02	.09	.02
<i>YPI Lifestyle</i>	.04	.09	.04
Adjusted R^2	.08		
F for change in R	4.26**		

Note. YPI= Youth Psychopathy Inventory; N= Neuroticism; A= Agreeableness; CU= Callous/Unemotional.

* $p < .05$, ** $p < .01$, *** $p < .001$.

explained an additional 16%. While in step 1 the *Interpersonal* factor of the YPI significantly predicted reactive aggression, it no longer showed a significant relationship with reactive aggression once A and N were included in the model. In step 2 the only significant predictor of reactive aggression was N whereby higher levels of N were associated with increased reactive aggression.

For proactive aggression, associations with normal and psychopathic personality traits were examined using logistic regression models. The first model (Model 4) included the IPIP factors as predictors. Individuals low in A were significantly more likely to be proactively aggressive than individuals with high levels of A as can be seen in Table 3.13. No other personality trait was found to be significantly related to proactive aggression.

Table 3.12 Hierarchical regression with reactive aggression as outcome variable and YPI factors as well as N and A as predictors

Model 3	Reactive aggression	B	SE B	β
Step 1	<i>Interpersonal</i>	.21*	.10	.28
	<i>CU</i>	.02	.09	.02
	<i>Lifestyle</i>	.04	.09	.04
	Adjusted R^2	.08		
	F for change in R	4.26**		
Step 2	<i>Interpersonal</i>	.14	.09	.18
	<i>CU</i>	.05	.10	.07
	<i>Lifestyle</i>	.04	.08	.05
	N	.18***	.04	.38
	A	-.12	.07	-.18
	Adjusted R^2	.24		
	F for change in R	13.41***		

Note. CU= Callous/Unemotional; N= Neuroticism; A= Agreeableness.

* $p < .05$, ** $p < .01$, *** $p < .001$.

In Model 5 the YPI *Interpersonal*, *CU* and *Lifestyle* factors were entered as predictors of proactive aggression. The analysis revealed that the *Interpersonal* factor was significantly related to proactive aggression (Table 3.14). With every one-unit increase on the YPI *Interpersonal* factor an individual was almost 4 times more likely to be proactively aggressive.

Table 3.13 Logistic regression with proactive aggression as outcome measure of the Big-Five personality traits

Model 5	B	SE B	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
Constant	3.56	2.0		35.18	
N	.25	.27	.75	1.28	2.18
E	.33	.31	.76	1.4	2.58
O	-.16	.35	.37	.84	1.92
A	-1.43***	.46	.10	.24	.59
C	-.16	.35	.43	.85	1.70

$R^2 = .12$ (Cox&Snell), $.16$ (Nagelkerke). Model $X^2(5) = 15.11$, $p < .01$.

Note. N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness.

*** $p < .001$.

Table 3.14 Logistic regression with proactive aggression as outcome measure of the YPI factors

Model 6	B	SE B	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
Constant	-1.87	1.37		.01	
<i>Interpersonal</i>	1.32*	.63	1.10	3.75	12.77
<i>CU</i>	.09	.55	.37	1.09	3.19
<i>Lifestyle</i>	.83	.55	.78	2.29	6.76

$R^2 = .14$ (Cox&Snell), $.19$ (Nagelkerke). Model $X^2(3) = 18.47$, $p < .001$.

Note. CU= Callous/Unemotional.

* $p < .05$

Lastly, Table 3.15. shows the results of a hierarchical logistic regression analysis, which was conducted to examine if the Big-Five personality factors could predict proactive aggression above and beyond the YPI factors. A was entered in the second step as it was the only FFM predictor that was found to be significantly related to proactive aggression in the Model 3.

Adding A to the model showed an improved model fit (R^2 for Cox & Snell and Nagelkerke).

The model showed that individuals with lower levels of A are more likely to be proactively aggressive. The Interpersonal factor of the YPI also remained a significant predictor of proactive aggression.

Table 3.15 Hierarchical logistic regression for proactive aggression and YPI factors and Big-Five personality traits as predictors

Model 7		B	SE B	95% CI for Odds Ratio		
				Lower	Odds Ratio	Upper
Step 1	Constant	-1.87	1.37		.01	
	<i>Interpersonal</i>	1.32*	.63	1.10	3.75	12.77
	<i>CU</i>	.09	.55	.37	1.09	3.19
	<i>Lifestyle</i>	.83	.55	.78	2.29	6.76
$R^2 = .14$ (Cox&Snell), $.19$ (Nagelkerke). Model $X^2(3) = 18.47$, $p < .001$.						
Step 2	Constant	.44	2.41		1.55	
	<i>Interpersonal</i>	1.49*	.66	1.21	4.45	16.30
	<i>CU</i>	-.83	.67	.12	.44	1.63
	<i>Lifestyle</i>	.86	.57	.77	2.35	7.23
	A	-1.37**	.53	.09	.25	.72
$R^2 = .20$ (Cox&Snell), $.26$ (Nagelkerke). Model $X^2(4) = 7.61$, $p = .01$.						

Note. CU= Callous/Unemotional.

* $p < .05$; ** $p < .01$.

3.3.4.2. Alcohol use

It was next examined to what extent the IPIP factors and YPI higher-order factors could predict alcohol use in young adults. Linear regression analyses were conducted. The AUDIT total score was used as outcome variable and all IPIP factors which were correlated with AUDIT total scores (E, C and N) were entered simultaneously as predictors in Model 1. In a separate regression analysis the *Interpersonal*, *CU* and *Lifestyle* factors of the YPI were

entered simultaneously (Model 2) with AUDIT total scores as outcome variable. These analyses showed that the IPIP factors E and N were significantly positively associated with alcohol use and C was negatively associated with alcohol use. Among the YPI higher-order factors *Lifestyle* significantly predicted alcohol use whereby higher scores on the *Lifestyle* factor were associated with increased drinking behaviour. This second model had a better model fit than Model 1, explaining 8% more of the variance as can be seen in Table 3.16.

Table 3.16 Linear regression analyses with alcohol use as outcome variable. Model 1 includes Big-Five personality traits as predictors. Model 2 contains the YPI factors as predictors

	AUDIT total		
Model 1	B	SE B	β
E	2.83***	.70	.32
C	-2.23**	.87	-.20
N	1.58**	.65	.19
Adjusted R^2	.16		
F for change in R	9.91***		
Model 2			
<i>Interpersonal</i>	1.10	1.37	.09
<i>CU</i>	-1.95	-.15	-.15
<i>Lifestyle</i>	7.24***	.49	.49
Adjusted R^2	.24		
F for change in R	15.81***		

Note. AUDIT= Alcohol use disorder identification test; E= Extraversion; C= Conscientiousness; N= Neuroticism; CU= Callous/Unemotional.

** $p < .01$, *** $p < .001$.

Lastly, a hierarchical regression analysis was conducted to examine if the IPIP factors could add predictive value above and beyond the YPI higher-order factors (see Table 3.17). The *Interpersonal*, *CU* and *Lifestyle* factors of the YPI were entered in step 1 and the IPIP factors in step 2 with AUDIT total scores as the outcome variable. This analysis showed that the *Lifestyle* factor was significant in predicting alcohol use and remained a significant predictor

even when FFM personality traits were added to the model. Adding the three IPIP factors E, C and N to the model however did not significantly improve the model fit.

Table 3.17 Hierarchical regression with alcohol use as the outcome variable. The predictors or YPI factors in step 1 and Big-Five personality traits in step 2

Model	AUDIT total	B	SE B	β
Step 1	<i>Interpersonal</i>	1.10	1.37	.09
	<i>CU</i>	-1.95	1.28	-.15
	<i>Lifestyle</i>	7.24***	1.25	.49
	Adjusted R^2	.24		
	F for change in R	15.81***		
Step 2	<i>Interpersonal</i>	.17	1.40	.01
	<i>CU</i>	-.51	1.40	-.04
	<i>Lifestyle</i>	6.59***	1.56	.45
	E	1.21	.76	.14
	C	.10	.97	.01
	N	1.53*	.65	.19
	Adjusted R^2	.26		
	F for change in R	2.22		

Note. CU= Callous/Unemotional; E= Extraversion.

* $p < .05$, *** $p < .001$.

3.4. DISCUSSION

The aim of Study 3 was to examine how the Big-Five personality factors were related to alcohol use and aggression and if they could predict these outcomes more effectively than psychopathic traits as measured by the YPI. The study differed from Study 2 in that it tested a sample of young adults as opposed to adolescents. Risk factors for behaviours such as alcohol use have been found to change over time, especially through adolescence.

Therefore, including a young adult sample alongside the adolescent group was useful because examining these cross-sectional studies it was possible to also examine if the same

or different personality traits predicted alcohol use and aggression in the different stages. First, the findings for aggression and alcohol use in young adults are discussed, followed by a discussion about similarities and differences between the two developmental stages.

3.4.1. Aggression

Within the literature, reactive aggression has been found to be related to high N, low A, and low C (e.g. Miller et al., 2003, 2012). With the exception of C we found the same pattern of results. Individuals with high levels of N were found to be more reactively aggressive. One reason why high N is perhaps associated with reactive acts of aggression is because individuals with high levels of N are more easily irritated and typically overreact in the face of unpleasant events (see Larsen & Buss, 2005). Biological theories of personality suggest that high N is related to an overactive (or easily activated) limbic system which causes heightened arousal that is associated with both fight and flight (Eysenck, 1967, 1990). A fight response would occur because a person with high levels of N experiences feelings such as anger, irritation and annoyance. This makes reactive aggression a plausible response to negative events.

Being reactively aggressive was also related to low levels of A in this study. Across the aggression literature low A seems to play an important role and is strongly and consistently associated with psychopathy (Miller et al., 2001; Miller & Lynam, 2003). The link between A and aggression, and by extension psychopathy, potentially exists because A conceptualises motives for individuals to continue and build up positive interpersonal relations (Jensen-Campbell & Graziano, 2001) by being empathetic, compliant and cooperative (Digman & Takemoto-Chock, 1981). Individuals on the other side of the continuum, the antagonistic side, are therefore less likely to get along with others in a group. It has been found that A is

positively associated with anger regulation (Rothbart & Ahadi, 1994) and in the face of interpersonal conflict, antagonistic individuals find compromise less appropriate and destructive strategies more appropriate than agreeable individuals (Jensen-Campbell & Graziano, 2001). Low A is hence related to more aggression-related behaviour. This was demonstrated in this study by the fact that low A was found to be not only related to reactive aggression but also to proactive aggression. However, N was the strongest predictor of reactive aggression here. This seems to suggest that emotional instability is at the core of reactive aggressive behaviour and is for instance in line with Dodge and colleagues who found that children who were reactively aggressive had problems with emotion regulation (Dodge et al., 1997).

Psychopathy is typically associated with aggression. It was therefore expected that the YPI higher-order factors would be related to reactive and proactive aggression and that the relationship between reactive aggression and secondary psychopathy (i.e. *Lifestyle* factor) would be stronger than for primary psychopathy. Vice versa it was expected that proactive aggression would be more strongly related to primary psychopathy, especially the *Interpersonal* factor as was shown in a meta-analysis by Blais and colleagues (Blais et al., 2014). The YPI *Interpersonal* factor did in fact show an association with proactive aggression in this study and was also the sole YPI factor related to reactive aggression. Perhaps the reason why an association was found for the *Interpersonal* factor and reactive aggression is because the items measuring reactive aggression were mostly interpersonal in nature (e.g. “Reacted angrily when provoked by others”, “Yelled at others when they have annoyed you”) and therefore were captured well by the *Interpersonal* factor.

Nonetheless, it is surprising that no relationship was found between reactive aggression and the *Lifestyle* factor. This factor comprises three sub-facets; thrill-seeking, impulsivity and irresponsibility. Theoretically, impulsivity is related to reactive aggression and this link has been demonstrated previously (Miller et al., 2012). Impulsive acts of aggression are not planned and negative consequences are not typically taken into account. Therefore it is not clear why no association was found here between *Lifestyle* and reactive aggression. One potential reason could be that although reactive aggression has been found to be related to secondary psychopathy, this link was predominantly found for the *Antisocial* factor (Blais et al., 2014). However, this factor is not part of the psychopathy measure used in the current study. It is therefore possible that the *Lifestyle* factor alone is not strong enough to predict reactive aggression.

One remaining question is whether the Big-Five personality traits could predict reactive aggression as effectively or more effectively than the YPI. For reactive aggression, N did, in fact, predict reactive aggression over and above the YPI factors. Whereas among the YPI factors the *Interpersonal* factor predicted reactive aggression, it no longer predicted reactive aggression once the Big-Five factors were added to the model. This shows that it is beneficial to include measures of standard personality traits alongside psychopathic traits when assessing reactive aggression. Especially because the findings suggest that N is important in capturing the characteristics linked to reactive aggression.

For proactive aggression, the *Interpersonal* factor remained a predictor when A was added to the model. However this improved the model fit, once again demonstrating that adding standard personality traits to investigating aggressive behaviour is meaningful. While reactive and proactive aggression could not be analysed within the same model, the model

of data found here – that proactive aggression is associated with primary psychopathy, and reactive aggression is linked to emotional dysregulation – fits in with the literature which shows that whereas non-psychopathic offenders engage in reactive aggression, only psychopathic offenders also engage in proactive aggression (Cornell et al., 1996).

3.4.2. Alcohol use

Drinking alcohol is typically found to be related to low A, low C, high N and E (Booth et al., 2013; Chassin et al., 2004; Malouff et al., 2007). Looking at both domain and sub-facet levels of the Five-Factor Model, Ruiz and colleagues found that C as a domain was strongly related to alcohol use as well as its sub-facets (Ruiz et al., 2003). A was also found to be related to alcohol use on the domain level. For N and E only the sub-scales measuring impulsiveness and excitement-seeking, were associated with alcohol use.

Surprisingly, in the current study A was unrelated to alcohol use (e.g. Malouff et al., 2007). However, the findings from this sample are consistent with the literature in terms of E, N and C. High E was found to be related to increased drinking behaviour here. Individuals who are extraverted are outgoing, sociable and seek excitement. They are hence more likely to be in situations that involve drinking-related behaviours. Specifically, the sub-facet of E, excitement-seeking, has been found to show a particularly strong relationship with alcohol use (Hopwood et al., 2007; Ruiz et al., 2003). Biologically this is meaningful as it has been theorised that extraverts have lower overall cortical arousal than introverts and therefore seek behaviours that increase their levels of arousal (Larsen & Buss, 2005). Alcohol may be a direct way of (at least initially) increasing levels of arousal which fits in with Kuntsche's findings of enhancement motives for drinking amongst individuals with high levels of E (Kuntsche et al., 2006).

Individuals with higher levels of N also showed increased drinking behaviour than individuals with low levels of N in the current studies. Particularly, the impulsivity facet of N seems to play a role for alcohol use and alcohol problems (Hopwood et al., 2007; Ruiz et al., 2003).

People with high levels of N are more likely than individuals with low levels of N to engage in escape-avoidance strategies of which drinking alcohol in stressful or generally negative situations is one. This is because these situations produce greater emotional reactivity in such individuals than those with low levels of N (Bolger & Zuckerman, 1995; Lahey, 2009).

C was also found to be associated with alcohol use behaviour such that low C was associated with increased alcohol use. This is in line with other studies that showed a link between alcohol use and low C with particular involvement of the facets assessing deliberation and dutifulness (Hopwood et al., 2007; Ruiz et al., 2003). Individuals who score low on the conscientiousness scale tend to be more unreliable, irresponsible and are more likely to break rules than individuals with higher levels of C (Larsen & Buss, 2005). Alcohol problems are a higher risk for individuals with low C perhaps because such individuals may not consider the consequences of drinking or feel that they do not need to stop drinking at a critical point, hence consume more alcohol than conscientious individuals.

Alcohol use was also related to psychopathic traits, specifically the YPI *Lifestyle* factor. The more irresponsible, impulsive and thrill-seeking an individual was the more alcohol-related behaviour they showed. This finding was expected and in fact reflects the relationship of the Big-Five personality traits and alcohol use (Ruiz et al., 2003). A comparison of the model fits (adjusted R^2) between the Big-Five personality traits and psychopathic traits showed that the model including the YPI factors was better at predicting alcohol use than the Big-Five personality traits.

In summary, the YPI scale seemed to be better at predicting proactive aggression and alcohol use in young adults than the Big-Five personality traits. Neuroticism however seemed to play an important role in the reactive aggression. Plausibly, the emotional reactivity measured by N is at the core of reactive aggression and therefore showed a stronger association with N than the YPI factors.

3.4.3. Differences between early adolescence and young adulthood for aggression and alcohol use

In these cross-sectional studies, low A was found to play a role in reactive aggression in both adolescence and young adulthood. In adolescence low A and C predicted reactive aggression and although C no longer predicted reactive aggression in adulthood, A remained a significant predictor. However for adults, high N was the most important predictor of reactive aggression, even more so than psychopathic traits. In adolescence, it was the *Lifestyle* factor of the YPI that best predicted reactive aggression.

For proactive aggression different characteristics seemed to be important. In adolescence it was the YPI *Callous/Unemotional* factor that was most strongly associated with proactive aggression whereas in adulthood it was the YPI *Interpersonal* factor. In each developmental stage, those traits remained predictors also in the presence of normal personality traits.

Research that investigates psychopathic traits in children and young adolescents typically use measures of CU traits as an indicator of psychopathic characteristics (e.g. Kimonis, Bagner, Linares, Blake, & Rodriguez, 2014). These traits seem to strongly predict whether an individual will develop adult psychopathy. Potentially that is why this trait was most strongly related to proactive aggression in our adolescent sample. However, as the individual matures, traits related to manipulation and exploitation will likely develop too and hence

this may explain why the *Interpersonal* factor plays an important role in proactive aggression in adulthood.

In adulthood high E also played a role in proactive aggression whereas in adolescence E did not. In both studies low A was found to be related to proactive aggression. A may therefore be a useful indicator for antisocial tendencies and a good early focus in intervention and prevention work in adolescence as persistent low A may be a risk factor for antisocial behaviour later on. The YPI factors were strong predictors of reactive and proactive aggression but differed in adolescence and young adulthood whereas the influence of A was stable over time. However, this is an assumption that needs to be assessed longitudinally.

In terms of alcohol use, some of the adolescents who indicated previous alcohol use may have done so under parental supervision for a special occasion whereas others may have engaged in drinking illegally, without the knowledge and supervision of the parents. These latter individuals are likely to have engaged in these behaviours in thrill-seeking and rule breaking circumstances. This fits in with the findings here that adolescents with low levels of A were most likely to have tried alcohol whereas psychopathic traits did not show a relationship with alcohol use in this age group.

In the young adult sample of Study 3 high N, high E and low C were found to be related to increased alcohol use. These findings are in line with previous research (e.g. Hopwood et al., 2007). As mentioned previously research suggests that higher levels of E are related to motives of enhancement (Kuntsche et al., 2006) whereas individuals were also found to drink alcohol as a coping strategy for instance as a function of poor emotional regulation (high N). In adolescence alcohol use is unlikely to be used as coping strategy. Therefore this may explain why alcohol use was predicted by different factors within the two samples.

Low C has previously been found to be negatively related to alcohol use on both factor level and all facet levels (apart from *Order*), showing its strong relationship to alcohol use and potentially misuse (Ruiz et al., 2003). However, the psychopathy factor *Lifestyle* was the best predictor of alcohol use in this adult sample. This may be because the *Lifestyle* factor captures the core elements that N, E and C measure (i.e. impulsiveness, excitement/thrill-seeking and irresponsibility) and this combination of characteristics may therefore have a stronger relationship with alcohol use. However, the comparison between the adult and adolescent sample needs to be handled cautiously as the adolescent sample had little exposure to alcohol and therefore a different measure of alcohol use had to be applied.

3.4.4. Limitations

Some limitations within this study should be addressed. First, the internal consistency for the FFM trait Openness in Study 2 was lower than for the other FFM traits ($\alpha=.57$, whereas the average α of the other FFM traits was .74). This could have affected the ability of Openness to predict the outcomes. One possible reason for the lower Cronbach's alpha is the content of the items relative to the age of the participants. At 14 years of age adolescents may not be able to adequately answer Openness items regarding 'trying new and foreign foods' or 'knowing whether or not it is good or misleading to have controversial speakers talk to students' because the majority of adolescents will still be dependent on their parents and hence be limited in their choices about foods compared to adults. In addition, of the five personality traits O typically has the lowest internal consistency, with lower alphas being typical and some researchers in fact disregard O as a trait (see García et al., 2005). Since O is also not typically found to be related to psychopathy in the literature it is less important to this study than the other FFM traits.

Another limitation is that measuring alcohol consumption is prone to under-reporting (Boniface & Shelton, 2013). Participants may not have accurately indicated the amount of alcohol they consumed either due to memory limitations or impression management. However, completing the survey anonymously on-line rather than disclosing information about alcohol use directly to a person may have decreased the likelihood of under-reporting consumption. Also, because different personality scales were used in Study 2 and Study 3 the comparisons made here have to be interpreted cautiously.

Additionally, a different measure of alcohol use would have perhaps been more useful for the adolescent population. Rather than measuring data in an ordinal fashion it would have been beneficial to ask participants to purely give the frequency at which alcohol had been consumed. These count data would have still have included many zeros due to most adolescents not drinking at all, but zero-inflated Poisson regressions could have been used to resolve this problem. This would have allowed us to keep all the information rather than dichotomising the data which meant a loss of power.

3.5. CONCLUSION

The studies presented here investigated standard personality traits, psychopathic traits and proxy psychopathic-like traits and their associations with alcohol use and aggression in two non-forensic samples of adolescents and young adults. Psychopathic traits as measured by the YPI were associated most strongly with aggression in 14 year old adolescents in a community setting. However, these same traits did not predict alcohol use. However, this may be partly due to the low number of adolescents drinking at this age. The PSPT factors were not as strong in predicting alcohol use and aggression as the YPI factors and FFM

personality traits in adolescents. Therefore it was decided to no longer include the PSPT in the subsequent studies.

In young adults the YPI was also a good predictor of alcohol and proactive aggression. However, low A was also an important predictor of proactive aggression. Although the YPI predicted reactive aggression, N was the strongest predictor. It was suggested that this may be due to that fact that individuals with higher levels of N have problems with emotional regulation (Dodge et al., 1997). Dodge and colleagues demonstrated that children from abusive backgrounds had more emotion dysregulation problems which increases the likelihood of displaying ineffective coping strategies such as reactive aggression (Dodge et al., 1997). Such children from abusive backgrounds tend to have insecure attachment to their care givers (Green et al., 1999; Riggs & Kaminski, 2010). It is therefore possible that attachment also plays a role in psychopathy and could be one reason for why they display higher levels of aggressive behaviour. There is some evidence in the literature that suggests that secondary psychopathy specifically is related to attachment issues although findings are mixed (Hastings, Tangney, & Stuewig, 2008; Mack, Hackney, & Pyle, 2011 vs. Brennan & Shaver, 1998). The next chapter will investigate this line of evidence to examine the role of attachment in psychopathy within the normal population.

CHAPTER 4: THE ROLE OF ATTACHMENT ON PSYCHOPATHIC TRAITS

4.1. CHAPTER OVERVIEW

As psychopathy is related to aggression and other antisocial behaviours, researchers have targeted investigations into the risk and protective factors implicated in the development of psychopathy. The current chapter examines the influence of one such potential risk/protective factor: attachment. Attachment is the bond between an infant and their caregiver and it influences the way an individual learns about other people's emotions, i.e. emotion processing (e.g. Dan & Raz, 2012; Steele, Steele, & Croft, 2008). This has implications, for instance, for the development of empathy. In order to investigate the role of attachment in emotion processing it is necessary to first establish whether attachment and psychopathic traits are related. This will be the central aim of this chapter. Although there is some evidence in the literature that attachment and psychopathy are linked (e.g. Frodi, Dernevik, Sepa, Philipson, & Bragesjö, 2001; Mack et al., 2011), inconsistent findings have been reported (e.g. Brennan & Shaver, 1998). This study will investigate a sample of undergraduate students and assess (i) if attachment security to mothers and fathers predict psychopathic traits (*Interpersonal, Callous/Unemotional, Lifestyle* factors) as measured by the Youth Psychopathy Inventory (YPI: Andershed et al., 2002), (ii) if personality traits, based on the Five Factor Model (FFM) of personality, moderate this relationship, and (iii) if different attachment styles are related to the YPI *Interpersonal, Callous/Unemotional, Lifestyle* factors.

4.2. ATTACHMENT AND PSYCHOPATHY

4.2.1. *What is attachment?*

The Theory of Attachment was first conceptualised by Bowlby (1969/1982). He proposed that infants need to form close bonds with an attachment figure because they are vulnerable at that young stage, and need attachment to parents in order to ensure protection and nurturance. Through this bond with the attachment figure, usually the mother, the infant has a secure base from which to explore the environment and in distressing situations the child is comforted by the attachment figure. Children develop autonomy through this process.

A secure bond exists where the caregiver is responsive and sensitive to their child's physical and emotional needs. Bowlby suggested this would positively influence the development of coping strategies, emotion regulation and empathy (Bowlby, 1982). For example, in a situation in which a child feels distress a caregiver with a secure relationship to their child is able to help the child to reduce the high levels of distress by hugging the child or by talking to it. The child learns, at least to some extent, to regulate his or her emotions through this process and over time is likely to regulate emotions better and perhaps also apply better coping strategies in distressing situations. On the other hand, in a relationship where attachment security is poor and distress is not reduced, the child may not learn to regulate emotions as well as a securely attached child.

Bowlby (1988) also suggested that through the attachment bond children develop Internal Working Models (IWMs) of attachment. These IWMs capture expectations about whether a child feels the attachment figure will be responsive and protective or not (IWM of others)

and also whether that child itself feels worthy of being responded to in a supportive way (IWM of self) (Bowlby, 1982). If the attachment figure is insensitive to the infant's needs or shows delayed or inconsistent responses, the child is less likely to have clear expectations of support and comfort from the caregiver. In these circumstances, Bowlby suggested that the child may become anxious or avoidant towards the attachment figure. Consequently, this would have a negative impact on the development of coping strategies, emotion regulation with regard to others as well as empathy and morals (Bowlby, 1982).

Therefore it is not surprising that the implications of attachment could be far reaching. Research has demonstrated that children with more secure attachment were less aggressive, more empathic and showed more positive affect in social situations than children with insecure attachment (Thompson & Gullone, 2008). In turn, this would suggest that in situations where such an early bond is not built or is suboptimal, problem behaviours such as antisocial tendencies may be more likely to occur later in life. This has in fact been found in a number of studies (e.g. Craig, Gray, & Snowden, 2013; Dadds, Jambrak, Pasalich, Hawes, & Brennan, 2011). It is possible that this link between attachment and antisocial behaviour also extends to psychopathy, impacting socialisation (development of empathy and morals) and aggressive as well as delinquent behaviours.

In order to investigate whether there is a link between attachment and psychopathy it is important to understand the differences between secure and insecure attachment in infancy, the behaviours associated with them and their relative influence on later life. Early work by Ainsworth and colleagues (1979) assessed attachment to primary caregivers - predominantly mothers – in an experiment that became well-known as the *Strange Situation*. These experiments allowed researchers for the first time insight into different

styles of attachment, based on the infants' behaviour towards their mothers. The researchers identified three main groups, outlined below.

Securely attached children explored the room with their mothers present; they expressed distress by the separation from the mother and sought contact with her again in the reunion phases. These babies were more interested in interactions with their mothers than with the stranger and any distress in the separation phase was due to the absence of the mother, rather than being left alone.

The second group of children showed *avoidant* behaviour towards their mothers in the reunion phases. Generally these children did not seek any or only little proximity and interaction with the mother in all phases of the experiment and behaved similar to the stranger as to the mother. During separation no distress occurred, or if it did this did not seem to be due to the mother leaving but generally due to being left alone.

The third group showed visible *resistance* to interacting with their mothers. However, at times they also sought contact with their mothers, demonstrating ambivalent behaviour towards them. These children with *resistant* attachment tended to show either more angry behaviour compared to other groups or were very unusually passive.

However, other researchers found that there were a number of children who, applying the Strange Situation, could not be categorised into one of the three attachment styles described by Ainsworth (Main & Solomon, 1986). These children were especially prominent in studies of children with a history of abuse and neglect (e.g. Crittenden, 1985). This unspecified group was investigated further and was later described as *disorganised/disoriented* (Main & Solomon, 1986). Children with a *disorganised/disoriented* attachment style seemed to struggle to cope with the separation from their mothers.

Behaviour patterns towards the attachment figure in this group of infants was inconsistent, odd and fearful with no apparent explanation. They often showed sudden outbursts of anger and distress followed by avoidance of parents.

These different infant attachment styles were linked to behaviour later on in childhood and impacted social and emotional adjustment (Bretherton, 1985). For instance, children from abusive backgrounds (and hence insecure attachment to their caregivers) struggled to understand and cope with emotions. They tended to get angry or even hostile seeing other children cry, rather than empathetically trying to sooth them as would typically be the case for securely attached children (Bowlby, 1988). Furthermore, Escobar and colleagues found that attachment styles were related to differences in brain activity when processing emotional facial expressions in adolescents aged 11-16 (Escobar et al., 2013). This is important because it is suggested that understanding facial expressions enables humans to understand the emotional states of others and is involved in the development of empathy (Skuse, 2003); something that is deficient in individuals with psychopathic traits.

4.2.2. Attachment in adults

Attachment styles and IWMs developed in childhood are argued to persist later on in life and are associated with different beliefs and expectations regarding relationships (Bowlby, 1982). Bartholomew and Horowitz (1991) described a model of attachment styles and associated IWM in adulthood that correspond to childhood attachment. *Secure* attachment describes individuals with a positive self-image (IWM of self) and a positive image of others (IWM of others). This means that such individuals typically feel that they are worthy of love, and feel that others generally are responsive and accepting of them. *Preoccupied* attachment describes individuals with a negative self-image but a positive image of others.

These individuals feel unworthy of being loved and hence strongly seek acceptance from others. The third style, *fearful-avoidant* attachment, captured individuals who have a negative image of themselves and others. Such individuals feel unworthy of love and they expect others to be rejecting and non-acceptant of them. Therefore they tend to avoid close relationships in order not to get hurt or disappointed. The fourth style was coined *dismissing-avoidant* attachment. Individuals with this style are thought to have a positive self-image but a negative image of others. They proclaim close relationships as unimportant and seek independence and self-reliance.

Needless to say, these attachment styles are relatively rigid theoretical prototypes and it is important to note that in Bartholomew and Horowitz' (1991) study, participants sometimes showed a mix of attachment styles at different times and within different relationships. However, as shown here, attachment security and attachment styles are informative of individuals' behaviour in interpersonal situations and relationships in general. Especially relevant for this study therefore are the insecure attachment styles as they can impact negatively on an individual and one consequence may be a tendency to engage in antisocial behaviour (Kochanska & Kim, 2013).

4.2.3. The link between attachment and psychopathy

Early work on attachment suggested that whereas secure attachment was a protective factor against antisocial behaviour, insecure attachment was a risk factor of antisocial behaviour in children and adolescents (Marcus & Betzer, 1996; Simons, Robertson, & Downs, 1988). Attachment to peers did not appear to have a strong association with antisocial behaviour, especially for girls, however insecure attachment to mothers and fathers were strong predictors of adolescents' antisocial behaviour (Marcus & Betzer, 1996). More recent

evidence supports this association, showing, for instance, that insecurely attached children had more externalising and internalising problems than securely attached children (Moss et al., 2006).

The evidence presented in previous chapters shows that psychopathic traits are associated with externalising and internalising problems, empathy deficits and emotion processing difficulties. It is not surprising that some researchers have tried to examine whether attachment and psychopathy are associated. Kosson and colleagues for instance investigated this hypothesis with a community sample of delinquent adolescent boys (M= 14.5 years) (Kosson, Cyterski, Steuerwald, Neumann, & Walker-Matthews, 2002). They assessed both adolescent and parent ratings of adolescent attachment and closeness to the family as well as peer attachment using the Inventory of Parent and Peer Attachment (IPPA: Armsden & Greenberg, 1987). They found moderate but significant correlations between psychopathic traits and lack of attachment to parents. Peer attachment was not related to psychopathic traits in their study. Although Kosson's study did not include a control group of non-delinquent adolescents to examine attachment between groups, the study alluded to the fact that interpersonal and emotional differences in terms of attachment can be seen in adolescents with psychopathic traits that are similar to those seen in adult psychopaths. Furthermore, a link between attachment and psychopathy was also demonstrated in non-delinquent young adults in the community. Mack and colleagues examined the relationship between anxious and avoidant attachment styles (i.e. insecure attachment styles) and psychopathic traits in university students. They found that both insecure attachment styles were associated with higher levels of psychopathic traits (Mack et al., 2011).

However, one problem that these cross-sectional studies have is that the direction of the attachment-antisocial behaviour association is unclear. Whereas the emphasis in these studies above was put on the effect of insecure attachment or poor parenting on antisocial behaviour it is also possible that behaviourally challenging children cause parents to adopt harsher parenting styles or feel a weaker attachment bond towards their children. To address this problem a number of researchers have conducted longitudinal studies on this subject. Kochanska and Kim (2013), for instance, assessed children's attachment to caregivers at age 15 months and followed them up at age 6 and 8 to assess antisocial behaviour. At age 6, teacher reports were examined, and at age 8 parent and child ratings were used. The findings showed robust effects of early attachment on later antisocial behaviour that were apparent in children who were insecurely attached to both parents. These children had significantly more externalising problems, such as conduct disorder or oppositional defiant disorder, than children who had secure attachment to at least one parent. This suggests that attachment in infancy may have an impact on the development of antisocial behaviour later on in life. However, Kochanska and Kim's study did not assess psychopathic traits.

A longitudinal study that assessed psychopathic traits as well as parent-to-child affect (e.g. how much parents criticised their children) was conducted by Tuvblad and colleagues (2013). They investigated children at age 9-10 and again at age 14-15. The researchers found that negative parent-to-child affect at age 9-10 increased levels of psychopathic traits at age 14-15. This was found to be irrespective of early heritable psychopathic personality. However, psychopathic traits at age 9-10 also negatively impacted on parent-to-child affect at age 14-15 (Tuvblad et al., 2013). This study therefore suggests that the relationship between parent-to-child affect and antisocial tendencies/psychopathy is bidirectional.

Although this study employed a measure of parent-child affect rather than a measure of attachment it demonstrates a link between the parent-and-child bonding and psychopathic personality and is in line with some existing evidence in the literature (e.g. Kosson et al., 2002).

Gao and colleagues further examined the relative role of parental bonding on psychopathy, but also took other potential risk factors into account. Within the normal (i.e. non-forensic) population, parental bonding still remained a significant predictor of psychopathic traits, as measured by the Self-Report Psychopathy Scale (SRP-II: Hare, 1985) even when factors such as gender of the child, ethnicity and abuse were taken into account (Gao, Raine, Chan, Venables, & Mednick, 2010). In their study, Gao and colleagues found this link to be significant for mother attachment and Factor 1 and Factor 2 of psychopathy. Paternal bonding also played a role but only for Factor 1, which was linked to low paternal control (i.e. lack of supervision and regulatory control). Such low paternal control had previously been found to be associated with externalising problems such as drug abuse and antisocial personality disorder (Enns, Cox, & Clara, 2002). Father attachment and its impact on psychopathic traits has also been shown in Flight and Forth's study (2007). They found that father attachment, as measured by the IPPA, was negatively correlated with the Psychopathy Checklist: Youth Version (PCL:YV) Lifestyle factor as well as Factor 2 of psychopathy (Lifestyle + Antisocial factors). Unlike Gao et al. (2010) however, Flight and Forth did not find a relationship between Factor 1 and father attachment.

Despite these findings, there has also been contradictory evidence suggesting no parental influence on children's psychopathic traits. For instance, Brennan and Shaver (1998) investigated a large sample of university students using the Relationships Questionnaire (RQ:

Bartholomew & Horowitz, 1991) which measures adult attachment styles. They did not find a link between attachment styles and psychopathic traits. However, their measure of psychopathy was contentious as they used a scale that measured antisocial, passive-avoidant, narcissistic and sadistic characteristics, which are not typically used to measure psychopathy. Another study that did not find a relationship between attachment and psychopathy investigated this link in adult prisoners (Frodi et al., 2001). However, their sample was very small, consisting of only 14 imprisoned men. They used the Adult Attachment Interview (Main, Goldwyn, & Hesse, 2002) and measured psychopathic traits by means of the Psychopathy Checklist Revised: Screening Version (PCL-R:SV: Hart, Cox, & Hare, 1995). Neither Brennan and Shaver (1998), nor Frodi et al. (2001) separately assessed primary and secondary psychopathic traits.

The studies that found a link between attachment and psychopathy and those that did not that were discussed here have one thing in common. They all used different measures of psychopathy and different measures of attachment. Therefore it is difficult to compare them and identify reasons for the mixed findings. What seems to be clear is that it is important to assess attachment to mothers *and* fathers as they may impact children's behaviour in different ways (Flight & Forth, 2007; Gao et al., 2010). Also it seems important to assess the different attachment styles, rather than secure and insecure styles only, as it may be attachment at the individual style level may be better a predictor of psychopathic traits (Mack et al., 2011; Schimmenti et al., 2014). Finally, it is important to assess psychopathic traits using validated measures and examine potential relationships with attachment for primary and secondary psychopathic traits separately because it has been established that these psychopathy constructs are conceptually different (Skeem et al., 2007). While primary psychopathic traits have been found to have some genetic component (e.g. Viding, Blair,

Moffitt, & Plomin, 2005), secondary psychopathy has been shown to be influenced by environmental factors such as trauma (Skeem, Poythress, et al., 2003; Vaughn, Edens, Howard, & Smith, 2009). It is possible therefore, that attachment has a stronger effect on secondary psychopathic traits.

The existing evidence shows that, although there are some inconsistencies regarding which psychopathy factor attachment is more related to, attachment seems to play a role in psychopathy and perhaps would help further our understanding of the underlying mechanisms of this personality construct. Therefore, further research in this area is needed. Since attachment is necessary for emotion regulation and the development of empathy, insecure attachment could have implications for the emotional deficits seen in psychopathic individuals as well as its behavioural consequences.

4.2.4. Attachment and the Five Factor Model (FFM) of personality

There have also been a number of studies investigating whether FFM personality traits are related to attachment. Such studies show that higher levels of Extraversion (E) are associated with greater attachment security to parents and this link has been shown in cross-section studies with children (Hagekull & Bohlin, 2003), adults (Roisman et al., 2007) as well as in a longitudinal study from childhood to adulthood (Fransson, Granqvist, Bohlin, & Hagekull, 2013). As mentioned previously, secure attachment means that an individual has a positive image of the self and others. They feel that they are deserving of love and assume that others will accept them. Therefore these individuals will be more likely to socialise with others and be more outgoing (high E) than individuals who feel that others will not like and accept them (Fransson et al., 2013).

Neuroticism (N) has also been related to attachment security (Hagekull & Bohlin, 2003; Fransson et al., 2012). This link showing higher N being associated with more attachment insecurity may exist because attachment is implicated in the development of emotion regulation and coping strategies and these aspects are associated negatively with N.

Some research also suggests a link between insecure attachment and low Conscientiousness (C) perhaps because C is to some extent related to cognitive processes, such as attention and executive function which in turn have been found to be associated with attachment (see Fransson et al., 2013).

Lastly, it has been found that high Openness (O) is linked to attachment security, such that those with secure attachment styles are higher in O. Arguably this is because securely attached children are allowed to, and feel safe to, explore their surroundings (Fransson et al., 2013; Hagekull & Bohlin, 2003).

The evidence presented here demonstrates that FFM personality traits are, to some level, involved with attachment and may also influence the relationship between attachment and psychopathy.

4.2.5. Current study

Attachment could be a potential underlying mechanism that is involved in the emotional deficits seen in psychopathic individuals. To investigate this claim it needs to be established first whether a link between attachment and psychopathic traits can be found in a non-forensic population. This current study investigates undergraduate students and assesses attachment for both parents as well as attachment styles. Psychopathic traits are measured using the Youth Psychopathy Inventory (YPI: Andershed et al., 2002). We also examine if the relationship between attachment and psychopathic traits is moderated by standard

personality traits to assess if these traits influence the relationship between attachment and psychopathy. To our knowledge this is the first time this has been examined.

Attachment interviews and self-report scales have been developed to tap into those bonds with attachment figures as well as the bonds individuals have in relationships or friendships. The Inventory of Parent and Peer Attachment revised (IPPAR: Armsden & Greenberg, 1987) is a self-report measure that is used here to assess attachment behaviours and feelings in relation to important attachment figures. Additionally, the Relationship Questionnaire (RQ: Bartholomew & Horowitz, 1991) is a very short attachment style questionnaire that gives descriptions of the four different attachment styles discussed earlier in this chapter (secure, avoidant, preoccupied and dismissing-avoidant). These attachment questionnaires are chosen for this study in order to capture a broad range of important factors, i.e. not only mother attachment but also attachment to fathers, and not only global attachment, but each of the different attachment styles. However, due to finding that peer attachment does not seem to be associated with psychopathic traits (Kosson, Cyterski, et al., 2002; Marcus & Betzer, 1996) and the issue of high drop-out rates in online surveys, it was decided to exclude the peer attachment scale in this study.

It is hypothesised that psychopathic traits will be negatively associated with attachment security to mothers and fathers. Since the literature is inconsistent as to how attachment to parents is related to the different psychopathy factors, no specific predictions were made regarding whether this relationship would be found for primary or secondary psychopathy specifically. It is hypothesised that high E and high A would be linked to secure attachment whereas high N would be linked to more insecure attachment. These FFM traits are also examined to see if they moderate the relationship between attachment and psychopathy. As

O has generally been found to be unrelated to psychopathy no moderation effect was expected. However, it is possible that O is directly related to attachment because securely attached children are free and encouraged to explore their environment and this curiosity could be linked to O (Fransson et al., 2013).

Since some of the research presented here suggests an inverse relationship between psychopathy and attachment security it is expected that the YPI higher-order factors will be negatively related to the secure attachment style.

Given that dismissing-avoidant attachment is linked to a positive self-image and a negative image of others it is expected that this style will be related particularly to primary psychopathic traits (i.e. *Interpersonal* and *Callous/Unemotional* YPI factors). Dismissing-avoidant attachment is also expected to be related to low A and low C because this attachment style is most strongly related to antisocial tendencies (Main & Solomon, 1986). This has been demonstrated with the example of aggression in the previous chapters.

The avoidant attachment style is related to a negative image of the self and others and is therefore thought to be more strongly related to secondary psychopathy, in line with Mack and colleagues findings (Mack et al., 2011). Preoccupied attachment is not expected to be related with psychopathic traits as this attachment style is related to seeking very close contact and approval in relationships which is not typically found in the psychopathy literature. Avoidant and preoccupied attachment styles are expected to be related to high N as they are related to anxiety. Avoidant attachment should also be related to low E and low A because such individuals tend to avoid interpersonal relationships.

In summary, the YPI psychopathy factors are hypothesised to be negatively associated with attachment security to both mothers and fathers. High E, high A and high O are

hypothesised to be linked to secure attachment. N on the other hand is expected to be negatively related to secure attachment. It is also investigated whether these FFM traits, apart from O, moderate the effect between attachment and psychopathy.

For attachment styles it is expected that the YPI factors will be negatively associated with secure attachment. Dismissing-avoidant attachment is hypothesised to be linked particularly to higher YPI *Interpersonal* and *CU* traits. Additionally, it is hypothesised that the avoidant attachment style will be related to higher YPI *Lifestyle* traits. No relationship is expected between psychopathic traits and the preoccupied attachment style. For FFM traits it is hypothesised that the preoccupied and avoidant attachment style will be related to high N with additional associations for avoidant attachment and low E and low A. Finally, the dismissing-avoidant attachment style is expected to be associated with low A and low C.

4.3. METHOD

4.3.1. *Participants*

Undergraduate students (n= 338) were recruited from the University of Nottingham. They were contacted via email through the departments of the University of Nottingham and the Personality Social Psychology and Health (PSPH) group participant pool. Participants were included if they were aged between 17-21 years and had completed all assessments. 109 participants were excluded due to them not completing all measures; leaving a total of 229 participants (59 males, 170 females, M= 19.24 years, SD= .89).

4.3.2. *Measures*

NEO-Five Factor Inventory see Chapter 2 (section 2.2.2. Measures).

Youth Psychopathy Inventory see Chapter 3 (section 3.2.1.2. Measures).

Inventory of Parent and Peer Attachment-revised (IPPAr: Armsden & Greenberg, 2009) is a self-report measure that was used to assess attachment behaviours and feelings in relation to important attachment figures (three sub-scales: attachment to mother, father and close peers). However, in this study the peer attachment scale was not included as discussed in section 4.2.5. The IPPAr therefore included 25 items for each attachment figure, which produces two different attachment scores; one for attachment to mothers and one for attachment to fathers (see *Appendix 4.2.*). Items assess trust, communication and alienation to parents and were measured on a 5-point Likert scale from “*Almost never true or never true*” (1) to “*Almost always or always true*” (5). The scale has previously shown good internal reliability for mother attachment ($\alpha=.87$), and father attachment ($\alpha=.89$) (Armsden & Greenberg, 2009).

Relationship Questionnaire (RQ: Bartholomew & Horowitz, 1991) is a short attachment style questionnaire. It gives short descriptions of four different attachment styles (secure, fearful-avoidant, preoccupied and dismissing-avoidant) from which the one that describes the individual best should be chosen. Each participant also rates each attachment style on a 7-point Likert scale from “*Disagree strongly*” (1) to “*Agree strongly*” (7) in relation to how well or poorly the description fits the individual (see *Appendix 4.3.*).

4.3.3. Procedure

Participants were contacted via email through the University of Nottingham academic departments and the PSPH mailing list. They were invited to take part in an online survey accessible through a link given in the contact email. First participants were presented with an information sheet and consent form (see *Appendix 4.1.*). Once they completed the

consent form they filled in the four questionnaires in the order described in the previous section (4.3.2.).

For taking part in the survey participants were entered into a £25 prize draw if they wished. Participants' responses and contact details were kept separately in order to maintain anonymity. This was done by instructing participants at the end of the study to send a separate email to the researcher if they wanted to be entered into the prize draw. This ensured that email addresses were saved in a separate file from participants' responses. One person was then selected by means of a random number generator and received a £25 voucher via email.

4.3.4. *Data analysis*

Attachment scores on the IPPAr were summed separately for attachment to mothers and fathers to obtain a total attachment score for each parent. A higher score represented more secure attachment. For the YPI, average scores for all 10 sub-factors as well as the three higher-order factors (*Interpersonal*, *CU* and *Lifestyle*) were calculated.

Attachment and YPI scores were checked for normality. Attachment scores for both mothers and fathers as well as ratings on the RQ for the different attachment styles were not normally distributed. Subsequent analyses for these measures therefore used non-parametric tests where appropriate.

4.4. RESULTS

This study aimed to examine the relationship between psychopathic traits and attachment. Initially, correlations were conducted between parent attachment and YPI higher-order

factors (*Interpersonal*, *CU* and *Lifestyle*) and FFM personality traits (see Table 4.1). More insecure attachment to mothers and fathers was significantly correlated with higher levels of psychopathic traits. Amongst the FFM personality traits, Openness was the only trait that was not significantly correlated with attachment to parents and YPI higher-order factors. Therefore O was no longer included in any follow-up analyses. N was negatively correlated with secure mother and father attachment whereas E and A were positively correlated with secure attachment to parents in line with our hypothesis. C was positively correlated only with secure mother attachment.

To examine the ability of attachment to parents to predict psychopathic traits, regression analyses were conducted. Mother and father attachment variables were entered simultaneously into the model as predictors and the psychopathic factors YPI *Interpersonal*, YPI *CU* and YPI *Lifestyle* were used as outcome variables in 3 separate analyses. Table 4.2 below summarises the results. Attachment to mothers was predictive of all YPI factors showing that less secure attachment was related to higher psychopathy scores. This relationship was strongest for YPI *Lifestyle*. However, R^2 in all three models was low with parental attachment explaining only 9% of the variance in YPI *Lifestyle* and only 6% and 8% of the variance in the YPI *Interpersonal* and *CU* factors, respectively.

Next it was investigated whether FFM traits moderated the relationship between attachment and psychopathic traits (Table 4.3-Table 4.5). Separate hierarchical regression analyses were conducted for YPI *Interpersonal*, YPI *CU* and YPI *Lifestyle* as outcome variables. The relationship of mother and father attachment with the YPI factors was investigated in separate analyses due to the attachment variables correlating with different numbers of FFM traits. For each analysis one FFM trait was used as moderator. The other traits were

entered as covariates in step 1. The interaction term was entered in step 3 leaving step 2 with the attachment variable and the moderator. These analyses were conducted to maintain an acceptable variable-to-sample size ratio. All predictor variables were mean-centred. The analyses showed that with the FFM traits added to the model, mother attachment remained a significant predictor of all YPI higher-order factors ($p < .05$). Father attachment was no longer significantly related to the *Interpersonal* or *CU* factor ($p > .05$). However, father attachment significantly predicted scores on the *Lifestyle* factor ($p < .05$). This relationship was moderated by N (see Figure 4.1).

A subsequent simple slope analysis was conducted with 1 standard deviation (SD) above and below the moderator variable (N) as suggested by Preacher (Preacher, Curran & Bauer, 2006). This showed that the relationship between father attachment and the YPI *Lifestyle* factor was strongest for individuals with moderate to higher levels of N. The analysis showed that insecure attachment to fathers seemed to remove the protective effect of being high on N, therefore increasing psychopathic traits (i.e. the *Lifestyle* factor).

Table 4.1 Spearman's rho correlation coefficients for YPI factors, FFM personality traits and IPPA attachment

Factors	α	1	2	3	4	5	6	7	8	9
1. YPI <i>Interpersonal</i>	.92	-								
2. YPI <i>CU</i>	.88	.64**	-							
3. YPI <i>Lifestyle</i>	.84	.50**	.42**	-						
4. IPPAr mother	.95	-.26**	-.28**	-.29**	-					
5. IPPAr father	.95	-.22**	-.20**	-.23**	.55**	-				
6. O	.63	-.01	-.12	.09	.06	.03	-			
7. C	.86	.17**	-.15*	-.45**	.20**	.12	-.05	-		
8. E	.77	.10	-.08	.20**	.18**	.24**	.08	.15*	-	
9. A	.79	-.51**	-.57**	-.35**	.31**	.35**	.11	.20**	.21**	-
10. N	.88	-.06	-.12	.01	-.21**	-.27**	.01	-.31**	-.40**	-.21**

Note. YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional traits; IPPAr= Inventory of Parent and Peer Attachment revised; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4.2 Linear regression analyses with YPI factors as outcome variables and attachment to parents as predictors

Variables	<i>Interpersonal</i>			<i>CU</i>			<i>Lifestyle</i>		
	B	SE B	β	B	SE B	β	B	SE B	β
IPPAr mother	-.15	.06	-.20**	-.18	.05	-.28***	-.16	.05	-.25***
IPPAr father	-.04	.05	-.07	-.01	.04	.74	-.05	.04	-.09
R ²		.06			.08			.09	
F for change in R ²		7.38***			10.27***			11.51***	

Note. CU= Callous/Unemotional traits; IPPAr= Inventory of Parent and Peer Attachment revised.

** $p < .01$; *** $p < .001$.

Table 4.3 Moderation analysis for mother and father attachment with YPI Interpersonal factor

Interpersonal	ΔR^2	β	Interpersonal	ΔR^2	β
Step 1	.35***		Step 1	.33***	
E		.23***	E		.22***
A		-.55***	A		-.57***
C		-.13*			
Step 2	.38**		Step 2	.34	
IPPAr mother		-.11*	IPPAr father		-.07
N		.17**	N		-.12*
Step 3	.38		Step 3	.34	
IPPAr mother x N		.05	IPPAr father x N		-.06
Step 1	.34***		Step 1	.31***	
A		-.55	A		-.57***
C		-.18**	N		-.18**
N		-.23***			
Step 2	.38**		Step 2	.34**	
IPPAr mother		-.11*	IPPAr father		-.07
E		.18**	E		.19**
Step 3	.38		Step 3	.34	
IPPAr mother x E		-.06	IPPAr father x E		-.05
Step 1	.06***		Step 1	.01	
C		-.24***	E		.12
N		-.10	N		-.02
E		.11			
Step 2	.37**		Step 2	.34***	
IPPAr mother		-.11*	IPPAr father		-.07
A		-.54***	A		-.57***
Step 3	.36		Step 3	.34	
IPPAr mother x A		.01	IPPAr father x A		.01
Step 1	.34***				
N		-.11			
E		.18**			
A		-.59***			
Step 2	.37**				
IPPAr mother		-.11*			
C		-.16**			
Step 3	.37				
IPPAr mother x C		.04			

Note. N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness; IPPAr mother= mother attachment; IPPAr father= father attachment.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 4.4 Moderation analysis for mother and father attachment with YPI
Callous/Unemotional factor

CU	ΔR^2	β	CU	ΔR^2	β
Step 1	.31***		Step 1	.32***	
E		.03	E		.03
A		-.56***	A		-.57***
C		-.04			
Step 2	.41***		Step 2	.38***	
IPPAr mother		-.16**	IPPAr father		-.04
N		-.34***	N		-.29***
Step 3	.41		Step 3	.38	
IPPAr mother x N		.07	IPPAr father x N		-.04
Step 1	.39***		Step 1	.38***	
A		-.60***	A		-.61***
C		-.12*	N		-.25***
N		-.29***			
Step 2	.41**		Step 2	.38	
IPPAr mother		-.16**	IPPAr father		-.04
E		-.07	E		-.07
Step 3	.41		Step 3	.38	
IPPAr mother x E		-.03	IPPAr father x E		-.002
Step 1	.06***		Step 1	.03*	
E		-.15*	E		-.14^
C		-.20**	N		-.20**
N		-.27***			
Step 2	.42***		Step 2	.38***	
IPPAr mother		-.16**	IPPAr father		-.04
A		-.55***	A		-.59***
Step 3	.42		Step 3	.38	
IPPAr mother x A		.01	IPPAr father x A		-.02
Step 1	.38***				
E		-.08			
A		-.60***			
N		-.28***			
Step 2	.41***				
IPPAr mother		-.16**			
C		-.11			
Step 3	.41				
IPPAr mother x C		-.02			

Note. N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness;
C= Conscientiousness; IPPAr mother= mother attachment; IPPAr father= father attachment.

^ $p=.052$; * $p<.05$; ** $p<.01$; *** $p<.001$.

Table 4.5 Moderation analysis for mother and father attachment with YPI Lifestyle factor

Lifestyle	ΔR^2	β	Lifestyle	ΔR^2	β
Step 1	.43***		Step 1	.19***	
E		.33***	E		.29***
A		-.32***	A		-.39***
C		-.49***			
Step 2	.45**		Step 2	.22**	
IPPAr mother		-.17***	IPPAr father		-.15*
N		-.01	N		.13*
Step 3	.45		Step 3	.26***	
IPPAr mother x N		-.02	IPPAr father x N		-.20***
Step 1	.33***		Step 1	.11***	
A		-.28***	A		-.34***
C		-.50***	N		.03
N		-.12*			
Step 2	.44***		Step 2	.22***	
IPPAr mother		-.17***	IPPAr father		-.15*
E		.34***	E		.36***
Step 3	.44		Step 3	.22	
IPPAr mother x E		-.09	IPPAr father x E		-.01
Step 1	.32***		Step 1	.08***	
E		.29***	E		.31***
C		-.52***	N		.21**
N		.04			
Step 2	.44***		Step 2	.22***	
IPPAr mother		-.17***	IPPAr father		-.15*
A		-.27***	A		-.33***
Step 3	.44		Step 3	.22	
IPPAr mother x A		.04	IPPAr father x A		.03
Step 1	.21***				
E		.35***			
A		-.37***			
N		.16**			
Step 2	.44***				
IPPAr mother		-.17***			
C		-.46***			
Step 3	.44				
IPPAr mother x C		.04			

Note. N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness; IPPAr mother= mother attachment; IPPAr father= father attachment.

* $p < .05$; ** $p < .01$; *** $p < .001$.

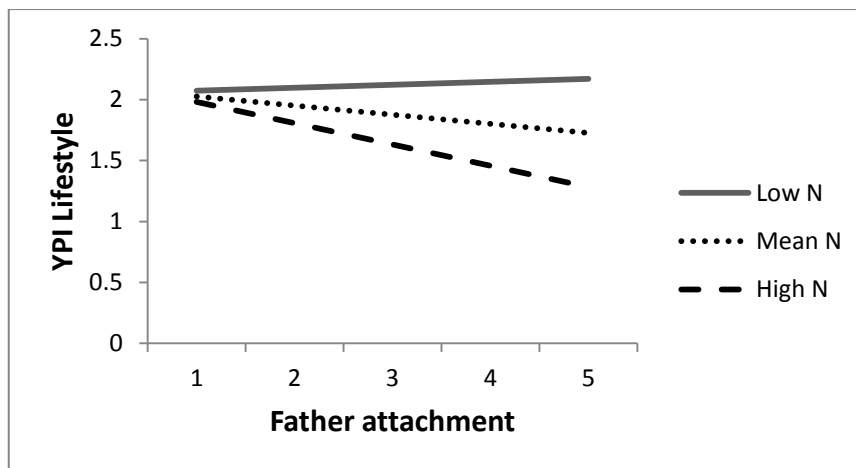


Figure 4.1 Moderation effect of Neuroticism (N) on father attachment (with higher scores indication more secure attachment) and YPI Lifestyle

Lastly the relationship between attachment styles and YPI higher-order factors as well as FFM traits was investigated. As can be seen in Figure 4.2, the majority of the sample indicated having a secure attachment style (32%). There was also a large amount of individuals with anxious avoidant attachment (27%). Dismissing-avoidant attachment was the least indicated category (10%).

Correlation analyses were performed (see Table 4.6) between attachment styles, FFM traits and YPI higher-order factors. The secure attachment style was positively correlated with E, A and C, as was hypothesised. Secure attachment was also related to lower levels of N and higher CU traits, as measured by the YPI. Avoidant attachment was positively correlated with N and negatively correlated with E and A. Similarly, preoccupied attachment was also significantly positively correlated with N and negatively with E.

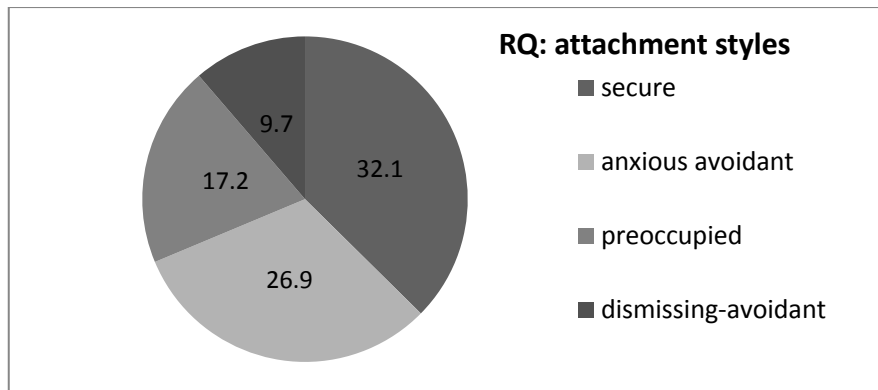


Figure 4.2 Attachment styles and percentage distribution

However, the correlation between preoccupied attachment and E was much weaker than for secure and avoidant attachment. Dismissing-avoidant attachment was significantly positively correlated to all psychopathic factors with the CU factor showing the strongest relationship. This attachment style was also negatively correlated with A.

Table 4.6 Spearman's rho correlations of normal personality traits, YPI factors and attachment styles

Factors	Secure	Avoidant	Preoccupied	Dismissing-Avoidant
<i>YPI Interpersonal</i>	-.035	-.042	-.016	.201**
<i>YPI CU</i>	-.189**	-.009	-.093	.389**
<i>YPI Lifestyle</i>	-.087	-.020	-.036	.170**
N	-.354**	.328**	.412**	-.097
E	.337**	-.336**	-.178**	-.082
O	-.007	.043	-.064	.065
A	.281**	-.178**	-.095	-.307**
C	.176**	-.070	-.114	-.006

Note. YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional;
N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness.
** $p < .01$.

4.5. DISCUSSION

Following on from the previous studies that examined the link between normal and psychopathic personality traits with regard to antisocial tendencies, the current study sought

to investigate the link between psychopathic traits and attachment. We also examined whether normal personality traits as measured by the FFM of personality would affect the relationship between psychopathic traits and attachment. This preliminary analysis was done also to determine whether or not attachment has an impact on psychopathic traits in the normal population and could potentially be investigated in subsequent studies to examine its involvement in emotion-processing deficits seen in psychopathic individuals. The results of the current study suggest that attachment, the FFM and psychopathic traits are associated in predictable ways. Therefore attachment would be a theoretically interesting variable to consider in future studies examining the FFM, psychopathy and emotional processing and pro-and antisocial behaviours.

4.5.1. Attachment to parents

First the link between attachment to parents and psychopathic traits was examined. Individuals with higher scores on all three of the YPI factors (*Interpersonal*, *CU* and *Lifestyle*) had lower attachment security to both mothers and fathers. This is in line with Kosson et al. (2002) who found this relationship in incarcerated adolescent males. However, similarly to Gao and colleagues who found mother attachment was significantly related to Factor 1 and Factor 2 of psychopathy (Gao et al., 2010), in subsequent analyses mother attachment was predictive of the YPI higher-order factors related to both primary and secondary psychopathy. Mother attachment also remained a significant predictor of the *Interpersonal*, *CU* and *Lifestyle* factors when the FFM personality traits were accounted for. The findings suggest that including FFM traits into the regression model improves the model fit. At the same time attachment to mothers has an impact on psychopathic traits, which persists after

inclusion of FFM traits into the models. Individuals with less secure attachment to mothers were more likely to have higher psychopathic traits.

With the inclusion of the FFM personality traits, father attachment was a significant predictor of *Lifestyle* only. This relationship was moderated by N, such that for individuals with higher levels of N, insecure attachment to fathers increased secondary psychopathic traits (*Lifestyle*). Similarly, Forth and Flight (2007), investigated the psychopathy-attachment link in male incarcerated adolescents using the same attachment measures as used in the current study, and found father attachment to be significantly and negatively related to Factor 2 (Flight & Forth, 2007). These findings suggest that although father attachment may not play as strong a role for psychopathy as mother attachment does it is still to some degree influential, especially for individuals higher in Neuroticism.

Contrary to our findings, Gao et al. (2010) found that one measure of attachment, paternal overprotection, was related to Factor 1 (i.e. *Interpersonal* and *CU*) whereas here we found a relationship only between father attachment and Factor 2 (i.e. *Lifestyle*). However, it is somewhat difficult to compare these results due to the difference in attachment measure. Overprotection was a measure of control over the child and granting privacy. However, the IPPAr, as used in this study, contained items measuring trust, communication and alienation. The two scales therefore did not measure the same constructs. Additionally, in Gao's study no personality trait measures were used (Gao et al., 2010). Father attachment in the current study only became a significant predictor of YPI *Lifestyle* once FFM personality traits were taken into account. It is therefore not clear how the relationship between attachment and psychopathy would have changed, if at all, if FFM personality traits had been included in Gao et al.'s study (2010).

It was clear from the findings that FFM personality traits had some impact on the relationship between attachment and psychopathy traits, showing that N impacted on the relationship between father attachment and the YPI *Lifestyle* factor. Previous studies showing a link between N and attachment suggested that this link may exist due to N measuring emotion regulation and coping strategies (Fransson et al., 2013) which develop, to some degree, through attachment. Similarly, in the current study, insecure attachment to fathers seemed to remove the protective effect of being high on N, therefore increasing psychopathic traits (i.e. the *Lifestyle* factor).

However, although there is a large body of evidence suggesting that secondary psychopathy is related to high levels of N, the current study did not find this effect consistently. The analyses of this study testified that the relationship between N and psychopathic traits is not always stable.

4.5.2. Attachment styles and psychopathy

Insecure attachment manifests itself in different ways with distinguishable behavioural consequences. If it is argued that psychopathy is related to insecure attachment it is useful to tear apart what type of insecure attachment individuals high in psychopathy display. The current study was an investigation into the relationship between attachment, the FFM traits and psychopathy, using a very short questionnaire to examine if different attachment styles were related to psychopathic traits. As was predicted, the findings suggested that individuals with a secure attachment style tend to have lower psychopathic traits, and specifically lower *CU* traits. Individuals at the extreme end of the *CU* trait scale do not feel regret or guilt when causing damage to people or objects (Andershed et al., 2002; Hare, 1980). They also do not tend to care when others are upset and do not feel emotionally close to others. It is

therefore consistent with the notion that attachment bonds with such individuals are difficult.

Furthermore it was found that all YPI higher-order factors were positively correlated with the dismissing-avoidant attachment style, as was expected. Individuals with this attachment style are described as avoiding intimacy, being very independent, self-reliant and have difficulties regulating emotions and using optimal coping strategies (Bartholomew & Horowitz, 1991). As described above, CU traits are linked to emotional distance with others, which could explain the link between this trait and dismissing-avoidant attachment.

It could be speculated that individuals with dismissing-avoidant attachment feel or want to feel detached from interpersonal relationships and the damage inflicted on them by their caregivers manifests itself in different ways amongst which the development of psychopathic traits may be one. This explanation would fit with the findings that the dismissing-avoidant attachment style is associated with increased levels of aggressive behaviour (Lyons-Ruth, 1996). Equally, this detachment from the attachment figure may impact the processing of emotional information, which is related to socialisation with implications for empathy and moral understanding.

4.5.3. Limitations

One potential limitation of this study was that the order of the questionnaires was not counterbalanced. It is therefore possible that participants were influenced by previous questions in making responses later on in the survey. There could also have been potential boredom effects which could have been avoided had the questionnaires been counterbalanced. However, this study was a short survey and it is unlikely that the order of questionnaires had a strong effect, if any, on participants' responses.

4.6. CONCLUSION

This study showed that attachment to parents and attachment styles, particularly the dismissing-avoidant style, are related to psychopathic traits. This relationship is particularly strong for mother attachment. Furthermore, the study demonstrated that there were little moderating effects of the FFM traits. However, insecure attachment to fathers seemed to remove the protective effect of being high on N, which increased *Lifestyle* levels.

As has been mentioned previously, it is possible that attachment has an impact on the way individuals learn to understand other people's emotions, which has implications for the development of empathy and prosocial behaviour. The next step is therefore to investigate whether individuals with higher psychopathic traits show emotion processing deficits or at least differences in responding to emotional stimuli compared to individuals with lower psychopathic traits. It could then be examined if insecure attachment is related to emotion processing deficits in individuals with higher and lower psychopathic traits. This will be the focus of the next chapter.

CHAPTER 5: PSYCHOPATHIC TRAITS, EMOTION PROCESSING AND THE ROLE OF ATTACHMENT

5.1. OVERVIEW

Psychopathy has long been associated with emotion-processing deficits. Psychopathic individuals, for instance, show difficulties identifying facial expressions (Patrick et al., 1993), and some researchers have found this deficit to be particularly strong for fearful and sad emotions (Blair, 2005). Others suggest a more general facial affect deficit that is not specific to certain expressions (e.g. Dolan & Fullam, 2006; Hastings et al., 2008). Yet more recent findings emphasise the importance of selective attention in emotion-processing which may modulate responses to emotion cues (e.g. Dadds et al., 2008, 2011). Dadds and colleagues, in particular, have suggested that attachment may play a role in the deficits seen in psychopathic individuals and how they perceive emotional facial expressions (Dadds et al., 2006, 2008, 2011).

In the current study, the effect of psychopathic traits on emotional processing of facial expressions and the role of attachment will be investigated. Participants will identify emotions in a facial expression identification task (Face task) whereby their eye movements are recorded. We will examine whether groups who are either high or low in psychopathic traits show differences in their ability to detect emotions from facial expressions and whether they allocate attention towards emotional facial expressions differently. It is hypothesised that individuals with higher levels of psychopathy will have difficulties identifying fearful and sad facial expressions compared to those low in psychopathy. In

addition, in the current study the role of attachment will be examined in relation to any association between psychopathy and emotion-processing.

Within this thesis so far, psychopathic traits have been examined with regard to antisocial outcomes. This study will, for the first time, examine prosocial behaviour and its link to psychopathic traits. There are very few studies that investigate this link behaviourally, especially in non-forensic settings. Therefore, in this study, we will assess prosocial tendencies by measuring donating behaviour in a Charity Dictator Game (CDG). In this game participants can donate money they previously earned to a charity. Since research in this area is sparse, this study will be informative in examining potential behavioural differences in prosocial behaviour of high and low psychopathy-scoring individuals. We will also be able to examine whether insecure attachment mediates the relationship between psychopathy and giving behaviour.

5.2. EMOTION-PROCESSING OF FACIAL EXPRESSIONS

5.2.1. *Emotion-processing and psychopathy*

Facial expressions are thought to be emotional responses to the environment, they represent emotional experiences and serve a communicative function (e.g. Adolphs, 2002; Blair, 2003). Learning to recognise other people's facial expressions allows humans to infer the emotional states of others. For instance, in situations of threat a person's facial expression of fear can signal an aversive cue that should be avoided (e.g. Mineka & Cook, 1993). Not only that, such distress cues have been suggested to facilitate inhibition of antisocial behaviour and elicit an empathic response (Blair, 2003, 2005; Marsh, Ambady, & Kleck, 2005).

In the attempt to define and understand psychopathy, one strand of research has focused on the potential underlying mechanisms that drive behaviour in psychopathic individuals. This gave rise to a number of theoretical models that have been further developed over the past decade.

A considerable amount of this research has been dedicated to emotion-processing in psychopathy. There are a number of possible reasons for this. One reason is that psychopaths lack empathy and are relatively unemotional. Therefore studying how psychopathic individuals perceive emotions, or if they even feel emotions at all, is important to understand the construct of psychopathy. Such knowledge is also a stepping-stone for investigating the impact any potential emotion-processing deficits may have on empathic concern for others, aggression, and other behaviours that are important for interpersonal understanding and conflict. Another reason for studying emotion-processing and psychopathy is that by examining what deficits are present in psychopathic individuals it is possible to build cognitive and neuropsychological models that help to integrate the different impairments and to help better understand the behaviours associated with the construct of psychopathy. Although a lot of work has been done, there is still uncertainty about the specificity of the emotion-processing deficit in psychopathic individuals (see *Table 5.1.*). Furthermore, there are competing models that try to explain why these deficits occur and what their consequences are. A process as complex as understanding other people's emotions, whereby it is necessary to use facial cues and other emotionally relevant information to interpret and predict peoples' behaviour and guide one's own behaviour, is a challenging process to study and understand. In the rest of this section, evidence will be presented illustrating emotion-processing deficits in psychopathic individuals as well as models aimed to explain these deficits.

Several meta-analyses support the assumption that psychopathic traits are linked to emotion-processing deficits. Marsh and Blair (2008) conducted a meta-analysis of 20 studies to assess emotion-processing difficulties in antisocial individuals. They assessed whether there are specific deficits for fear processing. Overall, the authors concluded that antisocial behaviour was directly associated with a specific impairment of fearful, sad and surprised facial affect, with the observed deficits most prominent for fearful expressions. However, one problem with this meta-analysis was that the sample was not only representative of individuals with psychopathic traits, but also comprised individuals with antisocial tendencies that extended beyond psychopathy.

A few years later, another meta-analysis was conducted (Dawel et al., 2012). Contrary to Marsh and Blair (2008), Dawel and colleagues concluded that findings in the literature regarding specificity of emotion-processing deficits and psychopathy were inconsistent. Some studies found deficits for fearful and sad facial expressions (e.g. Blair et al., 2004; Iria & Barbosa, 2009) whereas other studies showed evidence for a general emotion-processing impairment (e.g. Dolan & Fullam, 2006; Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009). Dawel et al. (2012) also criticised Marsh and Blair's study (2008) because their meta-analysis did not differentially look at the different facets of psychopathy. In Dawel and colleagues' meta-analysis, the affective factor (i.e. callous/unemotional traits) of psychopathy was separated out in order to avoid examining findings from a uni-dimensional perspective. Nonetheless, evidence for how the affective factor was related to emotion-processing deficits was not conclusive.

Most recently, Brook and colleagues conducted a review of the research regarding psychopathy and emotion-processing, using only studies that used the Psychopathic

Checklist revised (PCL-R: Hare, 1991, 2003) to measure psychopathy (Brook et al., 2013).

Brook and colleagues showed that despite the growing evidence of atypical emotion processing, the literature is divided as to whether this deficit in psychopaths is specific to particular emotions or is more general. *Table 5.1.* below gives a brief overview of the psychopathy research with study findings of specific and general emotion processing deficits in forensic and non-forensic settings.

From these findings, different theories about the underlying mechanisms that drive those deficits in individuals with psychopathic traits have been developed. Evidence for a specific deficit is typically found for fear alone or fear and sadness. Why psychopaths have difficulties identifying fear has been attributed to the *Fear Dysfunction Hypothesis* (Lykken, 1957; Patrick, 1994). Very briefly, this model proposes that there is a unitary system associated with fear and this system is impaired in psychopathic individuals. This means that in the presence of punishment signals, novel or innate fear stimuli, this fear system does not get activated effectively in psychopaths, whereas it typically causes activation of the fear system in non-psychopathic individuals (see Blair, 2005). These signals typically enable behavioural inhibition and increase attention. This model could therefore explain why psychopaths have lower inhibition, are more aggressive and cannot process emotions well because they pay less attention (Kimonis et al., 2011; Patrick, 1994). However, amongst the criticisms of this model, such as that there is not one unitary fear system (see Blair, 2005), one relevant point here is that this model cannot explain findings that show deficits for other emotional facial expressions such as sadness or surprise (e.g. Hastings et al., 2008; Kosson, Suchy, Mayer, & Libby, 2002).

In order to explain why individuals with psychopathic traits cannot adequately recognise fearful and sad facial expressions, another theory was proposed by Blair (1995, 2005). This model, the Integrated Emotions System (IES), suggests that although psychopaths can experience emotions, they cannot respond effectively to other people's distress cues that are related to fear and sadness. This is possibly due to differences in neural function related to the amygdala (Blair, 2005). What this means is that if a typically developing individual perceives distress in others, i.e. fear and/or sadness, this distress cue will typically induce discomfort. This aversive feeling tends to lead to behaviour that will terminate the distress cue or inhibit behaviour (e.g. aggression) that causes the distress cue in the first place (Perry & Perry, 1974). At the same time the aversive feeling also activates neural systems associated with empathy. The implications of this are that if distress cues do not cause discomfort and do not activate the empathy-related neural systems, aggressive behaviour will not be inhibited. Severe violence can be the consequence and is, in fact, the case for criminals with psychopathic traits. Research shows that imprisoned psychopaths commit more violent and more severe crimes than non-psychopathic prisoners (Hare, 2003; Kosson, Smith, & Newman, 1990). It has also been shown that psychopathy is related to lower empathic concern for others (S. T. Harris & Picchioni, 2013). Therefore the IES is able to explain the specific emotion-processing deficits of fear and sadness in psychopathic individuals, the lack of empathy and higher levels of antisocial behaviour.

However, some studies that investigated emotion-processing deficits in psychopaths have found a more general deficit for emotions. This general emotion-processing deficit was already mentioned by Cleckley in the early years of psychopathy research (Cleckley, 1976). He proposed that psychopaths cannot experience emotions the way typically developing

individuals can. This consequently affects the way they understand other peoples' emotions and actions related to emotions.

Taken together, the studies presented in *Table 5.1.* show that the findings are inconsistent, giving no full support for either the *low fear hypothesis*, the *Integrated Emotions Theory* or the general emotion-processing deficit theory. These observed inconsistencies may be due to methodological issues. For instance, Brook found that studies that used morphed video tasks showed stronger emotion-processing difficulties than tasks with static images (Brook et al., 2013).

There is also another more recent theory that proposes that the emotion-processing deficit in psychopathic individuals is related to attention (Baskin-Sommers et al., 2013; Dadds et al., 2011; Larson et al., 2013). Furthermore, Dadds and colleagues (2008, 2011) argued that humans have an innate preference to focus attention towards facial shapes and the eye region of faces. This preference towards eyes may be a beneficial process for infants to facilitate bonding and subsequent attachment with primary caregivers (Dadds et al., 2008). This is because through facial expressions of the caregivers nonverbal communication takes place and infants develop an understanding of their caregiver's emotions from looking at their face, and especially the eye region. In turn this understanding facilitates socialisation (Brody & Shaffer, 1982). However, if this attentional preference towards facial shapes and the eyes is not present, then bonding to caregivers may be hindered, and the development of understanding other people's emotions disrupted. Dadds suggested that this could lead to antisocial behaviour and may be related to psychopathy (Dadds et al., 2006, 2008). Research into this attentional focus towards the eyes may therefore widen our understanding of some of the underlying mechanisms involved in antisocial behaviour seen

Table 5.1 Overview of studies showing specific and general emotion processing deficits in psychopathy

Authors (year)	Sample	Setting	Task	Emotion deficit	Findings
Blair, Colledge, Murray & Mitchell (2001)	Children	Schools with behaviour difficulties	Morphed face task with 6 basic expressions from neutral	Fear, sadness	Children with CU traits showed deficits for fear and sadness
Blair, Mitchell, Peschardt, Colledge, et al. (2004)	Adults	Prison	Morphed face task with 6 basic expressions from neutral	Fear	Criminal psychopaths showed impairments of fear recognition
Dadds et al. (2008)	Children	Schools	University of New South Wales Facial Emotion Task with 5 basic emotions (not surprise) and neutral	Fear	Children with CU traits showed deficits for fear
Fairchild et al. (2009)	Adolescents with early-onset CD, adolescent-onset CD and non-CD controls	Offending service and community	Morphed face task with 6 basic expressions	General deficit	General emotion-processing deficit in adolescents with CD but strongest for fear, sadness and surprise
Kosson, Suchy & Mayer (2002)	Adults	Prison	Facial expression identification Task	Disgust	Psychopathic criminals showed impairments in detecting disgust
Iria & Barbosa (2009)	Adults	Prison and community	Fear go/no-go task Happy and neutral faces as no-go stimuli	Fear	Criminal and non-criminal psychopaths showed higher detection and discrimination errors for fearful stimuli
Book, Quinsey & Langford (2007)	Adults	Prison and community	Facial expression identification task with 5 basic expressions (except surprise)	-	No deficits found

Table 5.1. continued

Authors (year)	Sample	Setting	Task	Emotion deficit	Findings
Dolan & Fullam (2006)	Adults	Prison	Morphed facial expression identification task:	General deficit, especially sadness	General emotion processing deficits in psychopathic individuals but worst deficit for sad expressions
Hastings et al. (2008)	Adults	Prison	Facial expression task at 100% and 60% emotion intensity: Happy, sad, fearful, angry, shame	General deficit, Sadness, Happiness	Deficits were found especially for less intense emotions (60% intensity)

in psychopathic individuals (Marsh & Blair, 2008). Evidence supporting this claim comes from studies showing that children with CU traits pay reduced attention to the eye regions of faces, irrespective of emotion (Dadds et al., 2008). Because the salient cues for recognising fear lay in the eyes (Adolphs et al., 2005), paying less attention to this area explains the recognition deficits of fear. Interestingly, when these children with high CU traits were instructed to pay attention to the eye region, fear recognition improved (Dadds et al., 2008). However, some evidence showed that the eyes were also an important fixation point when identifying facial expressions displaying sadness (Eisenbarth & Alpers, 2011; Hernandez et al., 2009), and even anger (Eisenbarth & Alpers, 2011). If Dadds' theory is correct it is possible that sadness and anger are also not effectively recognised by individuals who pay less attention to the eye regions of faces.

5.2.2. Emotion-processing and attachment

Dadds and colleagues seem to suggest that the preference for faces and the eye region are related to bonding and attachment. As was shown in Chapter 4, there is wider evidence that psychopathy and attachment are linked. Therefore it is possible that attachment is a relevant predictor of emotion-processing deficits in individuals with psychopathic traits.

Attachment has been argued to have an impact on how emotional information is focused upon and interpreted (e.g. Niedenthal et al., 2002; Tucker & Anders, 1999). Having a preference for facial shapes and the eye region of faces may facilitate bonding (Dadds et al., 2008). In turn, such bonding (i.e. secure attachment) has been associated with the healthy development of emotion regulation, coping strategies and empathy (Bowlby, 1982). There have been a number of studies that investigated whether better attachment security was related to more effective processing of emotions. Niedenthal and colleagues (2002) assessed

adult attachment and perception of facial expressions of emotion. They used happy, sad and angry expressions from the Ekman and Friesen catalogue (1976), which were morphed to neutral expressions. Participants had to slide a bar that would scroll through the morphed faces and stop at the point at which they thought the expression was no longer visible. They showed that insecure attachment was related to lower sensitivity to sad and angry facial expressions under conditions of induced stress. Stress induction was performed by telling participants they would be participating in an experiment that caused high levels of anxiety in most people (Niedenthal et al., 2002).

Further support for the notion that individuals with insecure attachment process emotions differently from securely attached individuals comes from Suslow et al. (2010). They used an affective priming task with masked happy and sad faces and found that attachment avoidance was related to lower automatic responsiveness to sad faces. Avoidant individuals tend to resist close relationships and try to avoid emotional content. Therefore they pay less attention to emotions with negative valence. However, no such effect was found for attachment anxiety. Individuals who have anxious attachment tend to be aware of negative emotions and perhaps perceive these emotions more strongly than individuals with secure attachment (Niedenthal et al., 2002). However, Suslow's study did not measure how attachment was related to processing of fearful faces.

Neurologically, the different attachment styles have been found to relate to differences in brain activity when processing the emotional content of face stimuli (Escobar et al., 2013). Escobar and colleagues conducted an ERP study with adolescents. Participants were presented with happy and angry faces as well as pleasant and unpleasant images. Their findings suggest that different neural circuits are recruited when processing facial

expressions depending on how individuals are attached to their parents. Therefore attachment to parents may impact how emotional information is processed and interpreted. Unfortunately, the study only used a limited number of emotions and it is not clear how brain activity may vary for other emotions, such as fear or sadness.

Taken together, this evidence seems to suggest that attachment security and attachment styles are related differently to processing of emotional facial expressions. At the same time there seems to be a lack of studies investigating how attachment is related to fearful facial expressions. Investigating this link may be important for research on psychopathy. If the emotion-processing deficits found in psychopathic individuals are affected by attachment then the focus needs to be put especially on the processing of fearful expressions as well as sad and angry expressions.

5.2.3. Prosocial behaviour in psychopathy

To date there is very little research investigating psychopathy and prosocial behaviour. Prosocial behaviour is often assessed in economic games. Most of the studies that examine the link between economic games and psychopathy use Ultimatum Games (UG) in which two players have to split money between them. The proposer suggests the split and the receiver has to decide whether to accept the offer or to decline it. In the case of a decline none of the players receive any money. In this type of economic game individuals with high psychopathic traits tend to accept lower offers *less* often than individuals with lower psychopathic traits (Berg, Lilienfeld, & Waldman, 2013; Koenigs, Kruepke, & Newman, 2010).

There are only two published studies that examine choice behaviour of psychopathic individuals on a Dictator Game (DG). This game is similar to the UG in that it involves two players and money needs to be split between the two. However, in the DG, the proposer's

decision on how to split the money between himself and the other player cannot be rejected. The receiver has no impact on the proposer's decision. Dictator games therefore give insight into what individuals consider fair to give themselves and how much to give others. Since the offer cannot be rejected any money given to the receiver is thought to be related to prosocial behaviour, perhaps induced by empathy or guilt (Koenigs et al., 2010). Since an unfair offer cannot be rejected, individuals who have lower levels of empathy or/and guilt should give less money whereas in the UG such behaviour would most likely be punished by a rejection. As a result the proposer would lose his share of the money. This means that offers made on the UG are influenced by the receiver so the amounts offered on this game may not so much reflect prosocial behaviour as it does calculated compromise. On the other hand, higher offers on the DG should more likely reflect prosocial tendencies.

In the context of psychopathy, this would suggest that individuals who have high psychopathic traits should offer lower amounts on the DG than individuals with low psychopathic traits. Koenigs and colleagues examined this hypothesis in incarcerated males (2010). They split participants into a high and low psychopathy group and also differentiated between primary and secondary psychopathic traits. They found that participants with high primary psychopathic traits gave significantly lower amounts of money in the DG than secondary psychopaths and non-psychopathic offenders. However, it is noteworthy that primary and secondary psychopaths were split by how high they scored on an anxiety measure. Although anxiety seems to play a role in differentiating between the two psychopathy constructs, typically other factors are also measured. For instance, of the PCL-R four-factor structure the traits that correspond to primary psychopathy are related to affect (lack of, e.g. lack of empathy, callousness) and interpersonal characteristics (e.g. dishonest charm, manipulative) (Hare, 2003). Secondary psychopathy corresponds most with lifestyle

(e.g. parasitic) and antisocial behaviour. In Koenigs' study primary and secondary psychopathy were separated by taking the PCL-R total scores and taking the median split of anxiety scores from the Welsh Anxiety Scale (Welsh, 1956). So these findings may not correspond directly with other measures of primary and secondary psychopathy but do show a pattern of behaviour that is different from non-psychopathic individuals.

There has been only one study that looked at behaviour of psychopathic individuals on choice in the DG in the normal population (Berg et al., 2013). Berg tested university students and measured psychopathic traits using the Psychopathic Personality Inventory-Revised (PPI-R: Lilienfeld & Widows, 2005). The PPI-R follows a three-factor structure with the *Fearless Dominance* (FD) factor allegedly being most closely related to primary psychopathy (Benning et al., 2003). The PPI-R factor *Self-Centered Impulsivity* (SCI) is most closely related to secondary psychopathy and Coldheartedness (CH) was found to be a separate factor although the traits measured reflect the affective (callous/unemotional) factor of psychopathy (Ross et al., 2009). Berg and colleagues found that FD was unrelated to choices on the DG in the student sample. On the other hand CH seemed to impact behaviour whereby higher scores were associated with keeping more money to themselves.

Additionally, those individuals who scored high on both the CH and the SCI factor made more selfish decisions than individuals who were low on CH and high on SCI. Therefore CH seemed to be the strongest predictor of lower prosocial behaviour. The authors argued that perhaps the reason for a lack of relationship between selfish choices and FD existed because this factor is related to dishonest charm and manipulation of others. Since these traits are not necessary in the DG no association was found.

Given that economic games can assess a wide range of behaviours that are potentially related to psychopathy and given the very limited number of studies investigating behaviour on the DG in relation to psychopathy, more research in this area is needed. Whereas the generic DG investigates behaviour towards a potential stranger and factors such as competitiveness could bias the results, a version of the DG called the Charity Dictator Game (CDG) may be useful for studying behaviour in psychopathic individuals. This version of the DG investigates empathic giving behaviour in the context of known or unknown (invented) charities. Such research will give more insight into how psychopathic individuals behave on empathy-related giving tasks and whether they behave similar in forensic and non-forensic settings. If they do, then this would suggest a general tendency for individuals with psychopathic traits to be more selfish than non-psychopathic individuals. However, it is also possible that psychopathic individuals in non-forensic settings show less selfish behaviour than those in forensic contexts. This could be due to them having lower psychopathy scores than criminal psychopaths or perhaps these individuals in the community are more in tune with what is socially acceptable and therefore make more prosocial choices for strategic reasons.

5.2.4. Current study

From examining the literature, it becomes clear that there is some controversy about the emotion-processing deficits in psychopathic individuals. If a robust emotion-processing deficit exists in these individuals, we should find marked impairments in recognising at least fearful and sad facial expressions in high scoring psychopathic individuals compared to low scoring individuals. Perhaps such deficits are also reliant on factors other than psychopathic traits, which could potentially explain the inconsistencies found in the literature. Less secure

attachment has been found to be related to poorer emotion recognition and has also been related to psychopathic traits. This is why the current study will examine the effect of psychopathic traits on emotion-processing as well as the impact of attachment on this relationship. This research is important because these impairments are potentially related to abnormal moral/conscience development (Blair, 2005) and consequently increased antisocial and decreased prosocial behaviour.

The current study will also examine giving behaviour on the Charity Dictator Game. This is to investigate if self-reported indices of psychopathic traits in the normal population are related to behavioural indices of prosocial behaviour. In this context it can also be examined how attachment is related to prosocial behaviour and whether attachment affects the relationship between psychopathic traits and prosociality. In other words, it can be investigated if individuals with high psychopathic traits who also have insecure attachment are even less prosocial than individuals who have high psychopathic traits but have more secure attachment.

Additionally, since Blair (2007) suggested that impaired emotion-processing is also related to lower empathy, both cognitive and affective empathy will be measured in this study.

Cognitive empathy is the ability to take another person's perspective whereas affective empathy is the ability to feel what others are feeling (Davis, 1980). There is some research that suggests that psychopathic individuals are similar to non-psychopathic individuals in terms of cognitive empathy but psychopathic individuals have impaired affective empathy (Blair, 2007). It will be tested here if lower affective empathy is also related to less prosocial behaviour on the CDG.

Lastly, if emotion-processing deficits are related to lower levels of empathy (Blair, 2005) or are related to maladaptive socialisation (Dadds et al., 2008), emotion-processing deficits should be related to lower prosocial behaviour, especially in individuals with high psychopathic traits and less secure attachment. Therefore in this study sensitivity to emotions will be examined in relation to giving behaviour in the CDG.

It is noteworthy that abnormalities in the processing of emotional stimuli have also been found in other groups such as individuals with Autistic Spectrum Disorder (ASD) (Ashwin, Chapman, Colle, & Baron-Cohen, 2006; Sucksmith, Allison, Baron-Cohen, Chakrabarti, & Hoekstra, 2013). Individuals with ASD can have impaired social communication and display specific, repetitive behaviour patterns (DSM-IV, American Psychiatric Association 1994).

There is some research that suggests that the emotion recognition deficits seen in individuals with ASD are global (e.g. Hobson, 1993), while others argue that the deficits are more specifically related to negative facial expressions (Ashwin et al., 2006; Howard et al., 2000). However, evidence into such emotion-processing deficits is inconclusive as yet other studies have shown no abnormal emotion recognition in autistic individuals (Adolphs, Sears, & Piven, 2001; Bormann-Kischkel, Vilsmeier, & Baude, 1995). Therefore, in order to avoid a potential bias in our sample, participants were screened for autistic traits using the Autism Quotient 10 (AQ10: Allison, Auyeung, & Baron-Cohen, 2012) prior to the emotion-processing task. Participants were excluded from the study if they scored above the recommended threshold (see section 5.6.2. Measures).

The current study will test emotion-processing in an undergraduate sample. Iria and Barbosa (2009) found evidence that both criminal and non-criminal psychopaths show emotion-processing deficits. Therefore it should be possible to detect such deficits, should they exist,

in this non-criminal group (i.e. students). In order to examine this hypothesis, students with high and low psychopathic traits will be tested (i.e. high and low psychopathy groups). Since the study will be carried out with normal population, there is a risk that participants will not vary sufficiently in psychopathic traits. In order to avoid this problem and be able to detect potential emotion processing deficits, participants will be pre-selected based on scores on the Youth Psychopathy Inventory (YPI: Andershed et al., 2002). Participants who will score above and below the 75th and 25th percentile will be selected, creating a high and a low psychopathy group.

If Dadds et al. (2008) are correct, then the high psychopathy group will be less sensitive to facial expressions displaying fear and potentially sadness and anger (Eisenbarth & Alpers, 2011; Hernandez et al., 2009). They should pay less attention to eye region, the place that holds the salient cues for the recognition of these expressions. Participants in the high psychopathy group should also pay less attention to the eye region overall, irrespective of emotion. In order to test this eye tracking equipment will be used to measure how quickly after stimulus onset participants look at the eyes and how long in comparison to the rest of the image participants spend looking at the eye region. Individuals with high psychopathic traits are predicted to take longer to look at the eyes (if at all) and will, overall, spend less time looking at the eye region compared to the rest of the face compared to individuals with low psychopathic traits.

Additionally, according to Dadds and colleagues, the link between psychopathic traits and deficits in emotion-processing should be affected by attachment. Individuals in the high psychopathy group who also have low attachment to parents should show the greatest emotion-processing deficits and pay the least attention to the eye region of faces.

Furthermore, it would be expected that avoidant attachment will affect the relationship between psychopathy and emotion-processing as avoidant individuals typically avoid emotional content (Suslow et al., 2010) and hence should pay less attention to the facial expressions.

On the other hand, if Blair's IES theory (2005) is correct, the high psychopathy group should show deficits in the identification of both fearful and sad facial expressions. Because these deficits are associated with amygdala abnormalities, differences in eye movement patterns between the low and high psychopathy group may not be evident. Equally, even though attachment insecurity may be linked to psychopathy, attachment may not affect emotion processing in the high psychopathy group.

For the CDG it is predicted that the high psychopathy group will give less money to the charity than the low psychopathy group. Attachment security to parents and affective empathy should also affect behaviour on the CDG showing that less secure attachment and lower affective empathy are associated with lower donations on the CDG.

Donations in the CDG are also predicted to be related to emotion-processing, showing that individuals with lower sensitivity to negative emotions and especially those with less secure attachment will donate less to the charity than individuals who are sensitive to negative emotions and have more secure attachment. Therefore in this study, sensitivity to emotions will be examined in relation to giving behaviour in the CDG.

5.3. METHODS

5.3.1. *Participants*

Participants were recruited from the University of Nottingham. Emails were circulated among the different departments and faculties. Participants had to be aged 17 to 21 to participate. A total of 458 participants completed the pre-selection survey. They were told that if, in addition to filling in the survey, they were interested in taking part in an experimental study, they could give their contact details at the end of the survey and they would potentially be invited back for tasks involving eye tracking (for information sheet see Appendix 5.1.). A total of 293 participants left their contact details. After calculating their YPI total scores, 158 participants who scored in the 25th (N= 35) and 75th (N= 34) percentile were invited back to complete the behavioural experiment. A total of 69 participants completed the study (23 males, 47 females; M= 18.8 years, SD=.87; see Table 5.2.).

5.3.2. *Measures*

Youth Psychopathy Inventory see Chapter 3 (section 3.2.1.2. *Measures*). Internal consistency of the higher-order YPI factors in the current study was good: CU ($\alpha=.83$), Interpersonal ($\alpha=.91$), Lifestyle ($\alpha=.80$), Total ($\alpha=.92$).

Autism Spectrum Quotient 10 (AQ10: Allison, Auyeung, & Baron-Cohen, 2012). The AQ10 was used to identify individuals high on the autistic spectrum ($\alpha=.57$) as it is a potential confounding factor for the second part of the study which uses the emotion identification task. Ten questions assess autistic traits (e.g. “I usually focus on the whole picture rather than the small details”, see Appendix 5.2.). In order to avoid any confound with autism,

participants who scored above a recommended threshold (>6) were excluded from the second part of the study.

NEO-Five Factor Inventory see Chapter 2 (section 2.2.2. *Measures*). Internal consistency of the personality factors was good in the current study: N ($\alpha=.91$), E ($\alpha=.86$), A ($\alpha=.83$), O ($\alpha=.74$), C ($\alpha=.89$).

Psychopathic Personality Inventory – Revised (PPI-R): Lilienfeld & Widows, 2005). This psychopathy measure has been developed for the use in the normal population and contains 153 items. The measure follows a three-factor structure comprised of Fearless Dominance (FD), Self-Centered Impulsivity (SCI) and Coldheartedness (CH). Table 5.2 shows the sub-facets for each higher-order factor. Test-retest reliability, internal consistency and construct validity of the PPI-R have been tested previously in four undergraduate samples and indicated good results (Lilienfeld & Widows, 2005).

Each participant's questionnaire was checked for inconsistent responding on a 15 item-pair scale in line with Lilienfeld and Widows (2005). Scores of 14 or less indicated normal, acceptable levels of inconsistent responding. Scores of 15-16 were classified as atypical and scores higher than 16 were advised to be excluded from group analyses as these could indicate arbitrary responding. In the current sample participants had acceptable, low levels of inconsistent responding (≤ 14 , and only one person scored 15).

Table 5.2 Psychopathic Personality Inventory - revised higher and lower order factors

PPI factors	Example items
FEARLESS DOMINANCE	
<i>Social Influence</i>	When I meet people, I can often make them interested in me with just one smile.
<i>Fearlessness</i>	When my life gets boring, I like to take chances.
<i>Stress Immunity</i>	I don't let everyday hassles get on my nerves.
SELF-CENTERED IMPULSIVITY	
<i>Machiavellian Egocentricity</i>	If I really want to, I can persuade most people of almost anything.
<i>Rebellious Nonconformity</i>	I have always seen myself as something of a rebel.
<i>Blame Externalisation</i>	If I'd had fewer bad breaks in life, I'd be more successful.
<i>Carefree Nonplanfulness</i>	I like to act first and think later.
COLDHEARTEDNESS	
<i>Coldheartedness</i>	I look out for myself before I look out for anyone else.

Note. PPI higher-order factors in capital letters.

The reason why both the YPI and PPI-R were used was to cover a broader range of traits that are associated with psychopathy. Patrick and colleagues divided psychopathy into categories of Meanness (lack of empathy), Boldness (fearlessness) and Disinhibition (impulsivity) (Patrick et al., 2009). Whereas the YPI focuses on Meanness and Disinhibition, it focuses less on Boldness. The PPI-R on the other hand has a dedicated Boldness factor, FD. It also

measures Meanness (i.e. CH). In this way, it is possible to assess the wider spectrum of psychopathy in this study.

Inventory of Parent and Peer Attachment (IPPA) see Chapter 4 (section 4.3.2 *Measures*).

Internal consistency of the attachment measures was good in the current study: mother ($\alpha=.96$), father ($\alpha=.96$), peers ($\alpha=.93$).

Experience in Close Relationships-revised (ECR-r: Fraley, Waller, & Brennan, 2000). This 36-item attachment questionnaire measures adult attachment: attachment avoidance ($\alpha=.94$) and attachment anxiety ($\alpha=.92$) (see Appendix 5.3.). Avoidant individuals typically find close relationships and intimacy uncomfortable as they fear being disappointed or hurt. They therefore prefer independence (e.g. “I don't feel comfortable opening up to romantic partners.”). On the other hand, anxious individuals fear rejection and abandonment and therefore seek intimacy. Such individuals often want to be closer to their partner/friends than their partner/friends want to be (e.g. “I often wish that my partner's feelings for me were as strong as my feelings for him or her”). The ECR-R has good internal reliability and is unaffected by sample characteristics (Graham & Unterschute, 2014).

Interpersonal Reactivity Index (IRI: Davis, 1980). This 28-item questionnaire measures four constructs: perspective taking (cognitive empathy) ($\alpha=.76$), empathic concern (affective empathy) ($\alpha=.83$), fantasy and personal distress scale (see Appendix 5.4.). Perspective taking assesses how well individuals can see things from someone else's point of view. Empathic concern assesses how sympathetic individuals feel towards other people's feelings. These are the constructs relevant to this study. The fantasy and personal distress scales were not used in this study as they were not relevant.

5.3.3. *Materials*

5.3.3.1. *Pilot of the emotion-processing task*

As discussed previously, numerous studies have found emotion-processing difficulties in psychopathic individuals. However, they differ as to whether the deficit is specific to fear and sadness or whether it is more general. Differences in methods may partly contribute to these inconsistent findings. For instance, studies that have used morphed faces sometimes used neutral facial expressions as baseline from which images were then morphed into various different expressions. However, one problem with this approach is that neutral face stimuli can, without context, be mistaken for an emotional expression (Cooper & Langton, 2006; Cooper, Rowe, Penton-Voak, & Ludwig, 2009). Neutral faces have been suggested to be ambiguously threatening and that responses for neutral and angry facial stimuli can be similar. This could affect both the analysis as well as the interpretation of the results. Therefore neutral faces were not included but rather facial expressions were morphed from one expression to another.

Additionally, it has been shown that individuals occasionally confuse surprised facial expressions with fearful expressions (see Skuse, Morris, & Lawrence, 2003) as well as disgusted expressions with angry expressions (e.g. Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009). Therefore, only four facial expressions will be used in the current study, happy, sad, fearful and angry. Surprise and disgust will be excluded to avoid misidentification. In addition to the behavioural measure of identifying the facial expressions, participant's eye movements will be recorded. If Dadds and colleagues (2008) are correct, then individuals with high psychopathic traits should pay less attention to the eye region of the face stimuli.

A large variety of emotion-processing tasks exist in the literature. Some of these tasks use images either of emotional facial expressions or positive and negative stimuli. Other tasks use well-known paradigms such as the Stroop task or the dot-probe task and adapt them by including emotional content, i.e. use emotion vs. neutral words in the dot-probe task. Using these adapted tasks to measure emotion-processing showed marked differences in groups with high psychopathic traits compared to those with low psychopathic traits (e.g. Sadeh et al., 2013). However, Cooper and colleagues used the Posner cueing paradigm with emotional facial expressions to investigate differences in adult attachment style. In three studies they did not find consistent results. They argued that this could potentially be due to the paradigm not being appropriate for the study of emotion-processing (Cooper et al., 2009).

With this in mind, the study presented here used a forced-choice facial expression identification task (Face task). In order to examine participants' focus of attention, their eye movements were recorded in the current study. If behavioural differences between high and low psychopathic groups are observed, additional analyses of eye movements could examine whether or not these differences are associated with attention to the eyes, as suggested by Dadds et al. (2008, 2011).

In order to choose the facial stimuli, 20 pilot participants (10M/10F) were presented with photographs of individuals taken from two different databases, the Pictures of Facial Affect Series (Ekman & Friesen, 1976) as well as the Karolinska Directed Emotional Faces (KDEF) database (Lundqvist, Flykt, & Ohman, 1998). The aim was to identify stimuli with facial expressions that are clearly recognisable. Participants were shown images of males and females separately. From the KDEF database participants were shown three different individuals and one individual from the Ekman and Friesen database. These individuals were

presented on three photographs showing three different emotions (fearful, angry and sad). Happy images were excluded as these facial expressions were the least ambiguous stimuli. Participants were asked to name the expressions on the individuals' faces and asked to rate the attractiveness of the different individuals. Angry and sad facial expressions were identified more accurately than fearful expressions. For those stimuli participants were more accurate for the Ekman and Friesen stimuli than the KDEF stimuli. Overall, the Ekman and Friesen images were less ambiguous and participants recognised more of the expressions correctly compared to the KDEF expressions. Therefore, the Ekman and Friesen images were chosen for the task in this study.

For the main study, the target stimuli were morphed from one facial expression into another (*Figure 5.1.*) in 10% increments as used by Pollak and colleagues (Pollak & Kistler, 2002). Four facial expressions were used (fearful, happy, sad and angry) and in four conditions were morphed from one emotion into another. These conditions were: Happy-Fearful (HF), Happy-Sad (HS), Angry-Fearful (AF – see Figure 1) and Angry-Sad (AS). Images were presented on a computer screen for 2000ms. Participants sat 58cm away from the computer screen and each image had a visual angle of $24.2^{\circ} \times 16.1^{\circ}$. After each image disappeared participants had to make a forced-choice response to indicate what expression was presented. Less ambiguous images were shown twice (images 0-3 and 7-10) and more ambiguous images were displayed four times (images 4-6) in line with Pollak's experimental design (full range of stimuli in Appendix 5.5.).

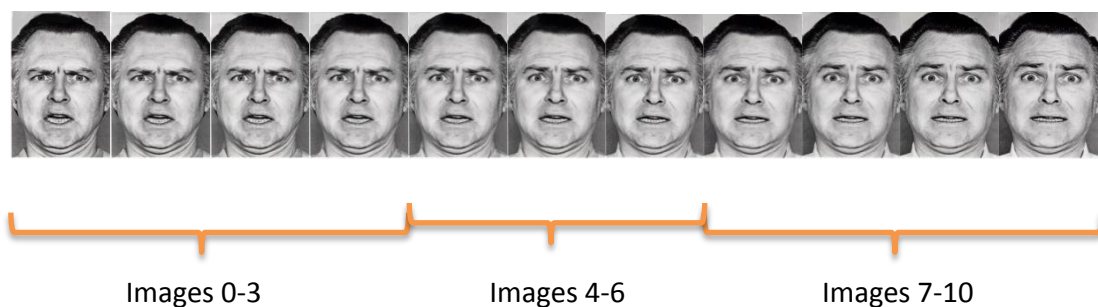


Figure 5.1. Morphed images on emotion continuum Angry to Fearful

An SR-Research Ltd EyeLink II eye tracker was used to record eye movements (250Hz temporal resolution). Pupil and corneal reflections were tracked from the left eye. A chin rest supported and stabilised participants' head position and decreased movement, hence enhancing accuracy of eye movement recordings. Drift correction was used between each trial to ensure accurate tracking measurements.

5.3.3.2. *Pilot of the Charity Dictator Game (CDG)*

Games such as the DG investigate behaviour towards a potential stranger and factors other than prosociality or altruism (e.g. competitiveness) can influence the results. Therefore in the current study, a version of the DG called the Charity Dictator Game (CDG) was used to examine prosocial behaviour in psychopathic individuals. There are different possible versions of the CDG. For example, people were given a letter about a charity that includes a personal story about a victim that the charity is helping. In different conditions of the task, participants were instructed to either stay objective or try to empathise with the person mentioned in the letter. These two conditions were tested in a group of 30 people. Participants in fact gave more money when in the objective condition than in the condition in which they were asked to empathise. Because we wanted to ensure a range of donation responses across the high psychopathy and low psychopathy groups, the final version used

for the experiment therefore included a letter that explained *objectively* what the charity was doing (for letter see Appendix 5.6.).

Another question that had to be addressed concerned the type of charity that would be presented to participants. Some studies give participants a choice of different well-known charities from which to choose. Other studies have used an invented charity in order to avoid any pre-existing biases associated with the real charities. For instance some charities may be religious charities, other charities may have bad press. In order to avoid such biases, a simple version of the CDG was used in which an invented charity, the World Children's Fund (WCF), was used. This charity has previously been used and evaluated in terms of its deservingness (Ferguson, Taylor, Keatley, Flynn, & Lawrence, 2012). In the Ferguson et al (2012) study, participants generally believed the WCF was a deserving charity, demonstrating its credibility. The letter that was used to explain what work the WCF was involved in used similar text to that used in UNICEF charity communications.

5.3.4. Procedure

5.3.4.1. Pre-screen phase

The study consisted of two parts. In the first part, undergraduate students from the University of Nottingham were contacted via email and asked to take part in a short online survey about personality. For filling out the survey participants were entered into a prize-draw and had the chance to win one of three £10 vouchers. This first survey was intended pre-screen individuals in order to identify those with low and high psychopathic traits. Participants filled in two questionnaires, the YPI and the AQ10. This second questionnaire was administered to detect individuals with autism. This was important because it is evident from the literature that individuals high on the autism spectrum have difficulties identifying

facial expressions (Hobson, 1993; Ashwin et al., 2006; Howard et al., 2000). This could confound results from the second part of the study which uses an emotion processing task. In order to avoid such effects based on autism, participants who scores above a recommended threshold (>6, see Allison et al., 2012) were excluded from the second part of the study, but still entered into the prize draws.

The participants' YPI total scores were then computed. Individuals who scored below the 25th percentile (low psychopathy group) and above the 75th percentile (high psychopathy group) were subsequently invited to participate in the second part of the study. Percentiles were calculated separately for males and females because males typically have higher psychopathy scores than females. This would result in an overrepresentation of males in the 75th percentile and accordingly, an overrepresentation of females in the 25th percentile.

Table 5.2 shows the groups' mean total YPI scores.

Table 5.2. Mean YPI total scores for males and females in the psychopathy groups

	25 th percentile		75 th percentile	
	N	M (SD)	N	M (SD)
Males	11	1.77 (.17)	12	2.61 (.19)
Females	24	1.61 (.22)	22	2.36 (.26)

This second part consisted of a facial expression identification task in combination with eye-tracking as well as a number of questionnaires. The order of the questionnaires as well as whether the behavioural task was administered before or after the questionnaires was counterbalanced across participants.

5.3.4.2. *Face Task*

The facial expression identification task was programmed in the SR Research Ltd Eyelink II experiment builder and was administered on a 40x30cm computer screen. After reading the instructions (Appendix 5.1.) the eye tracker was put on the participants' head. Pupil and corneal reflection (CR) were measured. Drift correction was used between each trial to ensure accurate tracking.

Participants were instructed to respond as accurately as possible and were told they would receive a reward if they performed well in order to increase engagement with the task. The experiment started with two practice trials. Participants first fixated on a dot in the centre of the screen. This was followed by the target image (a face), which was presented for 2 sec. Subsequently, two emotion words, on the left and right of the screen, appeared and participants had to press the corresponding key ('1' or '0') to identify the emotion of the face. The emotion words (happy, sad, fearful, angry) corresponded with the condition of the image. There were a total of 224 trials with a short break in the middle. After the completion of the task all participants received chocolates as a reward.

A response could be made only after the image had been presented for 2 sec. This ensured that all participants saw the stimuli for the same length of time and it was used to prevent impulsive responding (see Snowden, Craig, & Gray, 2013).

Participants completed the questionnaires without the experimenter present in order to avoid social desirability bias. The order of the Face task and questionnaires was randomised across participants. On completion of the questionnaires and Face task participants were told that they had earned £2 for their time. They were then asked if they would be happy to take part in a different and unrelated study.

5.3.4.3. *Charity Dictator Game*

In the CDG part of the study, participants were given instructions (Appendix 5.6.) which told them that they had to make some decisions about money. They read a charity letter and had to decide if they wanted to donate some, none or all of their just earned money (£2) to that charity. They were instructed to put one brown envelope into a sealed charity box with any or no donation and to keep the remaining envelope with their own money. They completed this task alone. Lastly, participants filled in a short questionnaire enquiring about their feelings towards the charity on a 7-point Likert scale from “*not at all*” (1) to “*extremely*” (7). The feelings they responded to were *uneasy, worried, soft-hearted, sad, alarmed, compassionate, heavy hearted, sympathetic, low-spirited* and *tender*. They also indicated how deserving they thought the charity was from “*not at all*” (1) to “*extremely*” (7) in line with previous research using CDGs (Ferguson et al., 2012).

A debrief was given to participants at the end of the survey to explain the nature of the study. They were told that both studies were in fact linked and that the charity they may have given money to was not real. However, it was stressed that all the money donated would go to a real charity that does the exact work described in the fake letter. All participants from the Face Task were entered into a £30 prize draw.

5.3.5. *Data Analysis*

Eye tracking data: Participants’ data were first examined in terms of pupil loss. Typically, pupil loss occurs when participants blink but it can also be indicative of tracking errors. Therefore, per trial, data with blink counts greater than 2 (1.8%) were excluded from further analyses. A rectangle of the eye areas of the faces was defined as Area of Interest (AOI) with a horizontal visual angle of 12.8° and a vertical visual angle of 4.0°. Both *proportion dwell*

time and *time to first fixation* in the AOI were used as outcome measures. Time to first fixation is the amount of time taken from stimulus onset to the first fixation in the AOI. 2.5% of data for time to first fixation displayed negative values which may suggest that participants already focused on the eye area before the beginning of the trial. Such data are meaningless if the aim is to measure the time period before attention is focused on the AOI. Therefore these data were excluded from further analyses. Furthermore, some data (9.1%) indicated that no attention had been paid to the AOI during a trial. However, these data are meaningful because they suggest a poorer identification strategy of facial expressions. In order to avoid losing these data points, they were replaced by the total trial time (2000ms). Proportion dwell time was calculated by dividing the total time spent looking at the AOI by the total trial time to give a measure of the degree of attention paid to the AOI.

Behavioural data: Responses for the stimuli were collapsed across male and female conditions to measure the overall effect of expression. In each condition images 0-3 and 7-10 were shown twice. The responses for these images were summed as follows: 0-1, 2-3, 7-8, 9-10 so that the resulting values consisted of four responses. Images 4, 5 and 6 (more ambiguous images) were shown four times each and therefore responses for each of these stimuli were summed individually. This meant that the resulting values all consisted of four responses. The point (face) at which participants changed their response in identifying the facial expressions was then calculated. This was done by fitting logistic functions to each participant's data for each condition. This measure was an index of participants' sensitivity, or perceived subjective equality (PSE) which indicated at what stimulus intensity the emotion was identified 50% of the time (Kingdom & Prins, 2010). It was the threshold at which the participant changed their response from saying that a face was showing one expression to saying that it was now showing the other.

Another measure that was extracted from these data was consistency of responding. This could be interpreted as the certainty with which participants responded to the emotions on the continuum. This is calculated using the Just-Noticeable Difference (JND). The JND measured the detection threshold; the smallest level of stimulation needed to identify a stimulus 50% of the time or in other words, it indicated how well the emotions were distinguishable. This is indicated by the slope of the function and was calculated by subtracting responses at 75% by responses at 25% in accordance with Kingdom and Prins (2010). A steeper slope (higher value) meant participants were more consistent in categorising the emotions. Flatter slopes (lower values) indicated less consistent responding, meaning that participants were less sure what emotion they were presented with. However, this JND does not indicate accuracy. Participants may for instance be very clear when a face turned from sad to fearful. However, they could be a lot more or less sensitive to one of these expressions in comparison to other people. An example of such a logistic function, showing both the threshold point (PSE) and slope (JND) is displayed in Figure 5.1.

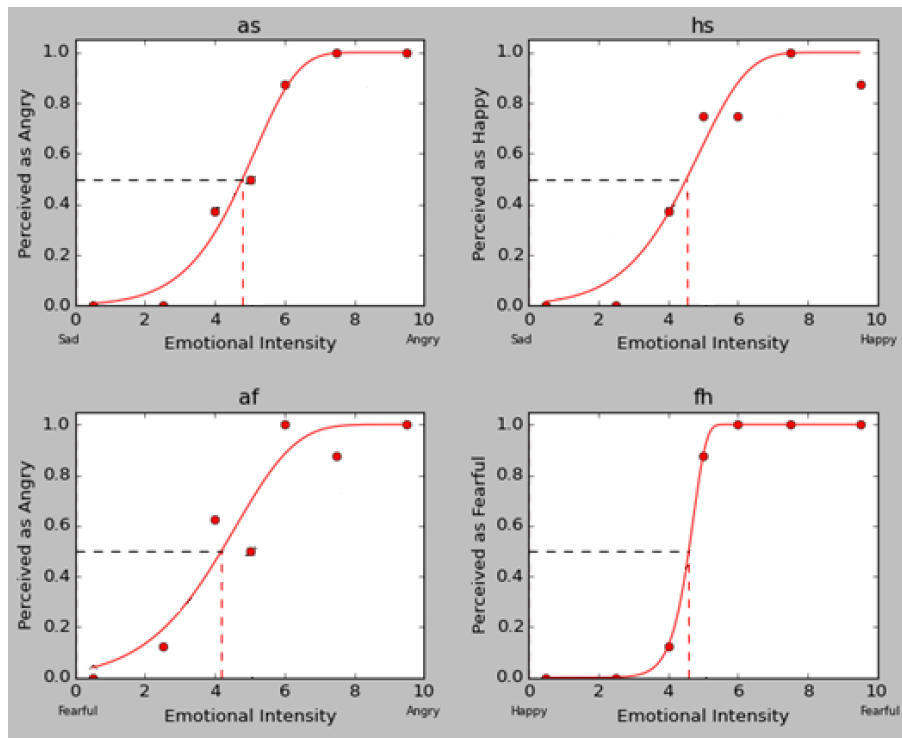


Figure 5.1 Example of logistic functions fitted for angry-sad (as), happy-sad (hs), angry-fearful (af) and fearful-happy (fh) conditions for one participant

5.4. RESULTS

The aim of this study was to investigate the extent to which individuals differed in terms of emotion processing and prosocial behaviour as a function of whether they were high or low in psychopathic traits. The initial analyses focused on establishing whether and how the two groups in this study differed in terms of personality and psychopathic traits, attachment, as well as cognitive and affective empathy. This was done using *t*-tests and Mann-Whitney U tests for normal and non-normal data, respectively (see **Error! Reference source not found.5.3.**). The results showed that the two groups significantly differed in psychopathic traits (except on the Psychopathy: PPI factor Coldheartedness). The groups also significantly differed on two personality dimensions that have been related to psychopathy; Conscientiousness and Agreeableness. Those participants in the high psychopathic traits group scored significantly lower on those dimensions (see **Error! Reference source not**

found.). Both perspective taking (i.e. cognitive empathy) and empathic concern (i.e. affective empathy) showed a trend whereby the high psychopathy group showed lower empathy levels. Furthermore, the two groups differed in attachment to parents with the higher psychopathic traits group showing less secure attachment. However, the two groups did not significantly differ in terms of anxious and avoidant attachment. Therefore no further group comparisons were carried out with these variables.

Table 5.3 PPI Factor total scores, IPPA, ECR mean scores and money donations for high and low psychopathy groups

Groups	High (N=34)	Low (N=35)	T-test, Chi-Sq or Mann-Whitney	p value
Variables	M (SD)	M (SD)		
<i>YPI Interpersonal</i>	2.43 (.43)	1.46 (.30)	U= 1132.00	.001
<i>YPI CU</i>	2.28 (.49)	1.69 (.30)	U= 1028.00	.001
<i>YPI Lifestyle</i>	2.64 (.41)	1.91 (.37)	t= -7.84	.001
PPI FD	50.82 (12.56)	42.97 (10.22)	t= -2.85	.01
PPI SCI	61.24 (8.56)	41.86 (8.51)	U= 1116.00	.001
PPI C	53.53 (12.00)	48.57 (10.80)	U= 724.50	.12
O	2.47 (.58)	2.32 (.57)	t= -1.04	.30
C	2.11 (.72)	2.72 (.53)	t= 4.01	.001
E	2.35 (.70)	2.43 (.61)	t= .47	.64
A	2.16 (.57)	2.86 (.44)	t= 5.74	.001
N	2.00 (.96)	2.02 (.76)	t= .12	.91
IPPAr mother	3.59 (.73)	4.06 (.71)	U= 351.00	.01
IPPAr father	3.21 (.74)	3.68 (.89)	t= 2.36	.01

IPPAr peer	3.96 (.62)	4.14 (.43)	U= 499.50	.25
ECRavoidant	3.25 (1.06)	2.89 (1.27)	t= -1.29	.20
ECRanxious	3.76 (1.14)	3.32 (1.04)	t= -1.68	.10
EC	2.47 (.82)	2.84 (.66)	U= 443.50	.07
PT	2.36 (.70)	2.66 (.62)	t= 1.88	.07
CDG donation MU	.79 (.86)	.99 (.77)	$\chi^2 = 2.66$	.34

Note. YPI= Youth Psychopathy Inventory; PPI= Psychopathic Personality Inventory; FD= Fearless Dominance; SCI= Self-centred Impulsivity; C = Coldheartedness; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N = Neuroticism; IPPAr= Inventory of Parent and Peer Attachment revised; ECRr= Experience in Close Relationships revised questionnaire; EC= Empathic Concern; PT= Perspective Taking; CDG= Charity Dictator Game.

Due to having a low and high psychopathy group rather than individuals on a psychopathic dimension, the possible analyses were restricted. For instance, since the high and low psychopathic traits differed significantly in attachment security this variable was not continuous and therefore could not be used as additional predictor of emotion-processing or prosocial behaviour. Instead attachment was used to measure direct and indirect effects on psychopathy and emotion sensitivity.

5.4.1. Face Task

Behavioural Analysis: The aim was to examine if being in the high psychopathy group predicted emotion-processing differences. In the main analysis, PSE values for the four conditions were entered as outcome variables and gender and psychopathy group as predictors in a linear regression model using the software package Mplus 6.11. The results are displayed in **Error! Reference source not found.** The analysis showed significant effects of psychopathy group for the conditions A-F, F-H and H-S. For A-S the effect was marginally significant ($p = .057$). In these conditions, participants in the high psychopathy group were less sensitive to fearful and sad expressions than participants in the low psychopathy group.

Gender did not significantly predict PSE ($p > .05$) except for the H-S condition ($b = -.35$, $SE = .18$, $p < .05$). Males in this condition were less sensitive to sad facial expressions ($M = 3.74$, $SD = .95$) than females ($M = 3.40$, $SD = .89$).

The same analyses were repeated for the classification of face expressions (JND). However, neither gender nor psychopathy group significantly predicted JND in the four conditions ($ps > .05$, see Table 5.4.).

Subsequently, mediation analyses were carried out to examine if attachment to parents mediated the effect of group on PSE scores (i.e. emotion sensitivity). This was done because the groups were preselected and had been hypothesised to differ in attachment security to parents. This justified examining direct and indirect effects of attachment on psychopathy and emotion sensitivity. Mother and father attachment were entered into the same models

Table 5.4 Mean threshold (PSE) and slope (JND) values and regression coefficients for the high and low psychopathy groups

		Low psych	High psych	B	SE B
<i>PSE</i>	<i>AF (SD)</i>	3.29 (.68)	3.68 (.90)	19.44***	2.01
	<i>FH (SD)</i>	4.47 (.70)	4.41 (.66)	3.18*	1.61
	<i>AS (SD)</i>	3.79 (.56)	3.81 (.80)	5.08	2.67
	<i>HS (SD)</i>	3.49 (.94)	3.55 (.91)	.37*	.19
<i>JND</i>	<i>AS (SD)</i>	1.01 (.32)	.91 (.44)	.01	.17
	<i>FH (SD)</i>	.38 (.25)	.47 (.31)	.03	.17
	<i>AS (SD)</i>	.62 (.26)	.63 (.35)	.05	.21
	<i>HS (SD)</i>	.67 (.32)	.69 (.31)	-.09	.09

Note. PSE= perceived subjective equality; JND= Just noticeable difference; psych= psychopathy group.

* $p < .05$; ** $p < .01$; *** $p < .001$.

alongside psychopathy group. Sensitivity (PSE) in the four conditions was regressed on psychopathy group and attachment in four separate models. The results showed no

significant direct or indirect effect of attachment on emotion sensitivity (see **Error!**

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Table 5.5 Direct and Indirect effects of mother and father attachment on psychopathy group and emotion sensitivity, all effects were non-significant

		Fearful- Angry		Happy- Fearful		Angry-Sad		Sad-Happy	
		B	SE B	B	SE B	B	SE B	B	SE B
Mother	Direct	-4.06	4.12	1.23	3.17	.94	5.29	.01	.53
Father	Direct	1.40	3.68	1.66	2.90	2.74	4.36	-.62	.47
	Indirect	-.02	.12	.01	.07	.01	.11	.01	.01

Due to finding differences for emotion sensitivity between the high and low psychopathy group it was further examined which specific factors within the high psychopathy group (N= 32) predicted lower sensitivity to fearful and sad facial expressions. Specifically the extent to which the different YPI psychopathy factors impacted on emotion-processing were examined (Interpersonal, CU, Lifestyle). Since the YPI does not include a measure of fearlessness, the FD factor of the PPI was also entered into the model. Due to the small number of participants, FFM traits were not included in this analysis. Linear regression models were computed for each emotion condition (see Table 5.6).

The results of the regression analyses showed that none of the YPI higher-order factors or the Fearless Dominance factor significantly predicted sensitivity of emotions.

As it was proposed that attachment may impact emotion processing in psychopathic individuals it was also investigated whether attachment to parents or attachment styles could predict emotion sensitivity in the high psychopathy group. Table 5.7 shows that none of the attachment measures significantly predicted emotion sensitivity in the high psychopathy group.

Table 5.6 Linear regression analyses for the high psychopathy group and psychopathy factors as predictors of emotion sensitivity, there were no significant effects

Model	Fearful-Angry (N= 32)			Happy-Fearful (N= 27)			Angry-Sad (N= 33)			Sad-Happy (N= 32)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
<i>Interpersonal</i>	-.21	.41	-.10	.33	.31	.22	.43	.35	.24	-.49	.41	-.23
<i>CU</i>	.67	.34	.38	.30	.27	.24	.31	.30	.19	.11	.35	.06
<i>Lifestyle</i>	.29	.43	.14	.03	.35	.02	.26	.37	.14	-.36	.45	-.17
Fearless Dominance	.01	.01	.01	.01	.01	.19	.01	.01	.07	.01	.01	.01
R^2		.13			.16			.13			.11	
F for change in R		1.02			1.06			1.07			.84	

Note. CU= Callous/unemotional.

Table 5.7 Linear regression analyses for the high psychopathy group and psychopathy factors as predictors of emotion sensitivity, there were no significant effects

Model	Fearful-Angry (N= 32)			Happy-Fearful (N= 27)			Angry-Sad (N= 33)			Sad-Happy (N= 32)		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Mother attachment	-.32	.24	-.27	-.06	.23	-.06	-.23	.21	-.21	.03	.26	.02
Father attachment	.23	.25	.19	.02	.20	.02	.33	.21	.31	-.14	.27	-.11
Avoidant	.11	.18	.12	-.09	.16	-.16	.28	.15	.37	-.13	.19	-.16
Anxious	-.17	.16		.02	.13	.05	-.17	.14	-.25	-.13	.19	-.16
R^2		.12			.02			.18			.03	
F for change in R		.93			.11			1.55			.18	

Eye movement analysis: Eye tracking data were used to measure attention paid to the face stimuli and to specific areas of interest (i.e. eyes) that hold salient cues for the identification especially of fearful expressions (Adolphs et al., 2005) between individuals with higher and lower psychopathic traits. Using multilevel modelling, the data were analysed without being aggregated and hence the amount of data points that could be used was increased. Eye movement data for the four conditions were treated as nested within participants.

Attachment scores for mothers and fathers were included as between subject factors as was psychopathy group membership. Continuous predictor variables were grand-mean centred (participant score – average overall participation score; in line with Hayes, 2006) and random intercept models computed.

The baseline model was computed to examine if participants differed, on average, in how soon they attended to the eye region of the stimuli as well as how long they dwelled on that region of interest in proportion to the rest of the image. The results showed that the estimated variances for all conditions significantly differed from zero, meaning that participants varied in time to first fixation ($X^2(16) = 544.88, p < .001$) and proportion dwell time ($X^2(16) = 428.69, p < .001$) in the eye region.

Next it was examined if group differences existed for participants with higher and lower psychopathic traits in attention paid to the eye region. The first model included *Group* (high/low psychopathic traits) with time to first fixation as outcome variable. This model was not significant, $X^2(6) = 10.09, p = .12$ (see Table 5.8). It was also analysed if the groups would differ on proportion dwell time. This model ($X^2(6) = 15.51, p < .05$) showed no significant effect of psychopathy group on proportion dwell time in the four conditions (see **Error! Reference source not found.5.8.**).

Table 5.8 Multilevel modelling with time to first fixation and proportion dwell time on group

	Fearful-Angry		Happy-Fearful		Angry-Sad		Sad-Happy	
First fix	B	SE B	B	SE B	B	SE B	B	SE B
Group	3.98	71.73	9.87	75.55	36.67	73.14	41.66	67.78
Dwell								
Group	3.98	71.73	9.87	75.55	36.67	73.14	41.66	67.78

In order to investigate the impact of attachment, further models were computed to examine the direct and indirect effects of mother and father attachment on time to first fixation. The analyses showed no significant direct or indirect effects for mother and father attachment (see **Error! Reference source not found.5.9.**). The same analyses were conducted for proportion dwell time. No significant direct or indirect effects of attachment were found (see *In addition to the main analyses, an exploratory analysis was conducted examining the reaction time (RT) data. It examined if individuals in the high psychopath group were slower at identifying the facial expressions compared to low psychopathy group.* Overall RTs were averaged across male and female faces and across same stimuli. The resulting RTs for the four conditions were compared between groups. No significant results were found using Mann-Whitney U tests (see Table 5.11).

Table 5.10 Multilevel models with proportion dwell time on groups and parent attachment 5.10).

Table 5.9 Multilevel models with time to first fixation on groups and direct and indirect effects of mother and father attachment

First fix	Fearful-Angry		Happy-Fearful		Angry-Sad		Sad-Happy	
	B	SE B	B	SE B	B	SE B	B	SE B
Group	20.47	71.77	26.40	75.13	46.29	72.25	55.80	67.87
Mother	10.11	63.31	31.16	57.96	1.81	63.91	32.61	56.96
direct								
Mother	-4.62	28.73	-14.20	26.28	-.83	29.15	-14.86	25.99
indirect								
Father	-19.34	51.59	-50.76	53.58	-13.87	52.84	-23.18	47.60
direct								
Father	11.06	29.67	29.03	31.03	7.93	30.11	13.26	27.13
indirect								
	$\chi^2(1)= 4.08, p<.05$		$\chi^2(1)= 4.14, p<.05$		$\chi^2(1)= 4.08, p<.05$		$\chi^2(1)= 4.12, p<.05$	

In addition to the main analyses, an exploratory analysis was conducted examining the reaction time (RT) data. It examined if individuals in the high psychopath group were slower at identifying the facial expressions compared to low psychopathy group. Overall RTs were averaged across male and female faces and across same stimuli. The resulting RTs for the four conditions were compared between groups. No significant results were found using Mann-Whitney U tests (see Table 5.11).

Table 5.10 Multilevel models with proportion dwell time on groups and parent attachment

Dwell	Fearful-Angry		Happy-Fearful		Angry-Sad		Sad-Happy	
	B	SE B	B	SE B	B	SE B	B	SE B
Group	-60.13	92.75	-62.60	89.02	-60.92	95.20	-41.46	83.01
Mother direct	46.82	68.69	-15.70	52.32	-17.93	60.71	-30.96	55.07
Mother indirect	8.61	27.44	7.17	28.81	8.19	27.57	14.13	25.64
Father direct	46.82	68.69	48.34	64.89	36.08	69.90	29.25	60.84
Father indirect	-26.77	39.28	-27.64	36.54	-20.63	39.31	-16.73	33.92
	$\chi^2(1)= 4.10, p<.05$		$\chi^2(1)= 4.08, p<.05$		$\chi^2(1)= 4.08, p<.05$		$\chi^2(1)= 4.08, p<.05$	

Table 5.11 Mann-Whitney U tests for reaction times in the four conditions

Groups	High (N=34)	Low (N=35)	Mann-Whitney	<i>p</i> value
Variables	M (SD)	M (SD)		
AF	3023.54 (280.18)	2967.39 (226.23)	U= 429.00	.38
AS	3067.11 (309.23)	3024.96 (272.58)	U= 464.00	.69
FH	2931.24 (228.99)	2894.89 (211.61)	U= 431.00	.39
HS	2908.49 (258.07)	2891.16 (253.23)	U= 470.00	.75

Note. AF= Angry-Fearful; AS= Angry-Sad; FH= Fearful-Happy; HS= Happy-Sad.

5.4.2. Charity Dictator Game

The amount of monetary units (MU) that participants donated to the charity clustered around 0, 1-5 and the maximum 10 MU. No donations clustered within 6-9 MU (Figure 5.2).

Due to the distribution of the donations, a categorical variable was computed with the categories being giving no, some money or all of the earned money.

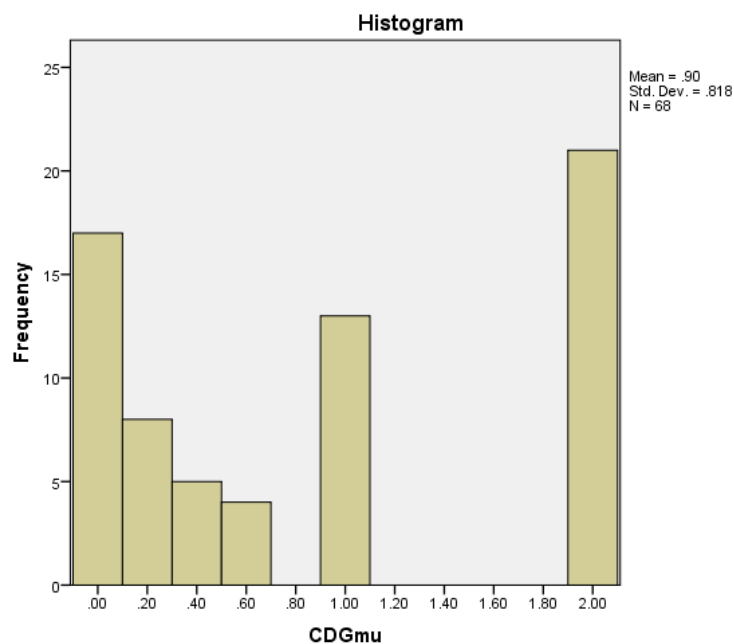


Figure 5.2 Distribution of money donation in monetary units (mu) of 20p

First it was checked that donating money to the charity was not affected by gender. A Chi-Square test was computed. The results showed that there was no effect of gender on money donation, $\chi^2(2, N=68) = 4.85, p = .09$.

Next it was assessed whether group differences existed between high and low psychopathic individuals and amount of money donated. A Chi-Square test revealed no significant difference between groups, $\chi^2(2, N=68) = 2.31, p = .32$.

Additionally, it was examined if attachment and felt deservingness of the charity moderated the effect of psychopathy group on giving behaviour. Using the money donation variable with 3 categories (none, some, all) for this analysis indicated issues due to a high percentage of cells having zero-frequency. Therefore this analysis was conducted using a logistic regression and money donated was categorised into money donated versus no money donated. *Group* and attachment to mothers and fathers were entered in the first step as

well as empathic concern. These variables were first mean-centred. In the second step the interaction terms for mother and father attachment with group as well as empathic concern were entered. The model was not significant, $X^2(7) = 13.30$, $p = .07$. Being in the high or low psychopathy group did not predict prosocial giving, nor did attachment to parents or empathic concern (see Table 5.12).

Table 5.12 Logistic regression for money donation with attachment as moderator

Model	B	SE B	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
Constant	.88*	.41		2.47	
Group	.86	.72	.57	2.25	9.72
Mother attachment	2.25	1.17	.96	9.44	93.18
Father attachment	-.27	.71	.19	.76	3.08
Empathic concern (EC)	-1.93	1.1	.02	.15	1.26
Group x mother	-1.62	1.04	.03	.20	1.53
Group x father	1.10	.41	.50	3.00	17.84
Group x EC	2.40	1.26	.93	11.04	113.81

$R^2 = .18$ (Cox&Snell), $.27$ (Nagelkerke). Model $X^2(7) = 13.30$, $p = .07$.

* $p < .05$.

A logistic regression model was also computed for group and deservingness of the charity as well as the group x deservingness interaction in the second step. This was done to examine if the reason for donating money was dependent on how much participants valued the charity. However, deservingness did not moderate the effect between group and giving behaviour ($B = .75$, $SE = .53$, $p = .16$).

Lastly it was examined if sensitivity to negative facial expressions was related to donation amount in the CDG in order to investigate if emotion-processing deficits had an impact on prosocial behaviour. A one-way ANOVA was computed with amount donated (none, some, all) and the PSE for three conditions that were normally distributed (SH, HF and AS). The

results showed that sensitivity to emotional facial expressions was not related to giving behaviour in this study (see Table 5.13). Since the PSE FA (Fear-Angry) variable was not normally distributed a Kruskal-Wallis Test was conducted. The analysis showed that there was no significant effect of emotion sensitivity in the FA condition on money donated, $H(2) = 1.14, p = .57$.

Table 5.13 One-way ANOVA with money donation (none, some, all) and emotion sensitivity

Donation	df	F	<i>p</i>
PSE HF	2, 55	.94	.40
PSE AS	2, 63	1.21	.30
PSE SH	2, 63	.10	.90

Note. PSE= Perceived subjective equality; HF= Happy-fearful; AS= Angry-Sad; SH= Sad-Happy

5.5. DISCUSSION

This study aimed to investigate if differences in processing of emotional facial expressions could be observed in university students with high and low psychopathic traits and to what extent attachment influenced this relationship. It was suggested that insecure attachment could be a mechanism that diminishes the capacity for emotion-processing in psychopathic individuals. To assess this, behavioural and attention (via eye movement) measures were collected.

The second aim was to investigate if psychopathic traits in the normal population were related to giving behaviour (i.e. prosocial behaviour) and to examine if attachment affected this relationship. It was hypothesised that less secure attachment would be related to lower prosocial behaviour in line with previous research (Thompson & Gullone, 2008). Lastly, it was investigated if sensitivity to emotions was related to prosocial behaviour because if emotion-processing deficits are related to lower levels of empathy (Blair, 2005) or to

maladaptive socialisation (Dadds et al., 2008) deficits in recognising emotions should be an indicator of lower prosocial behaviour.

The groups tested in this study consisted of individuals with high and low psychopathic traits. As expected, these groups differed on dimensions of psychopathy, such that those higher in psychopathy trait measures scored higher in Fearless Dominance and Self-Centered Impulsivity as measured by the PPI-R, lower in attachment security to parents and lower in personality traits associated with low psychopathy, i.e. Conscientiousness and Agreeableness. In the next sections the behavioural and eye tracking results will be discussed, followed by the findings for the CDG.

5.5.1. Face Task: Behavioural Results

In the Face Task, male and female images in four emotion continuums were presented to participants: angry-fearful, happy-fearful, happy-sad and angry-sad facial expressions. The results showed that in conditions with fearful stimuli and the Happy-Sad condition individuals with higher psychopathy traits were less sensitive to fearful and sad facial cues compared to participants with low psychopathy traits. The same trend was found for the Angry-Sad condition. In all conditions individuals in the high psychopathy group attributed more of the fear- and sadness-related facial cues to the opposing emotion (i.e. anger or happiness) compared to low psychopathy individuals. This is in line with Blair's theory of the Integrated Emotions System (IES: Blair, 2005), demonstrating a specific emotion processing deficit for fear and sadness (e.g. Blair, Colledge, Murray, & Mitchell, 2001; Blair, 2005). The fact that the specific emotion-processing deficits of facial affect have been replicated here suggests that psychopathy traits, even in the normal population, are associated with mechanisms that cause impaired recognition of distress: fear and sadness. Specifically, Blair

proposed in his IES that psychopathic individuals show amygdala abnormalities that are linked with insensitivity to distress cues (Blair, 2005). Typically sad or fearful stimuli (i.e. facial expressions) will induce aversive feelings in the observer and will lead to individuals inhibiting behaviour that may have caused these cues, such as aggressive behaviour. However, Blair suggested that individuals with high psychopathic traits are insensitive to these particular distress cues, will therefore not have an aversive reaction and consequently will not inhibit aggressive behaviour. At the same time, neural systems related to empathy will not get activated. This makes highly psychopathic individuals more aggressive and more violent than individuals with low psychopathic traits (e.g. Gretton, Hare, & Catchpole, 2004). Other research into emotion-processing deficits in psychopathy has suggested attachment may play a role (e.g. Dadds et al., 2008). Therefore Dadds' theory could also account for the lower sensitivity for sad facial expressions in the high psychopathy group found in this study. However, it was also examined if attachment security to mothers and fathers influenced the relationship between psychopathic traits and identifying emotional expressions. Attachment security was found to have no impact on the ability to recognise facial expressions in this sample.

One of the problems in the literature is that studies investigating the link between attachment and psychopathy as well as attachment and emotion-processing have used different measures of attachment. It is possible that the measure used in this study (IPPAr) is insensitive to the emotion-processing deficits found in psychopathic individuals. Instead it may be particular attachment styles that are related to suboptimal emotion-processing. Niedenthal et al. (2002) suggested that the four attachment styles (secure, preoccupied, fearful-avoidant and dismissing-avoidant) are related differently to how individuals process emotional content (Niedenthal et al., 2002). Although avoidant and anxious attachment

styles were measured in this study, these styles were not further analysed because the high and low psychopathy groups did not significantly differ on these styles. In addition, the relatively small sample size limited the analysis to a small number of predictors. Therefore, it would be informative to examine the specific effect of the different attachment styles on emotion-processing in psychopathic individuals. This will be a focus of the next study.

5.5.2. Face Task: Eye Movement Results

Dadds proposed that because humans have an innate preference to look at the eye regions of other people, this facilitates bonding and subsequent attachment with caregivers. Paying close attention to the face and eyes of the caregiver will help the child develop an understanding of the caregiver's emotions and will be important for socialisation and the development of conscience (Kochanska, Egeland, Eisenberg, Goldberg, & Kagan, 1997; Kochanska & Murray, 2000). Because the eyes are particularly salient cues for the identification of fearful expressions (Adolphs et al., 2005), it was proposed that inattention to the eye region will lead to deficits in recognising this emotion. Dadds studied children and adolescents with psychopathic traits and found them to pay less attention to the eye region of faces compared to non-psychopathic children (Dadds et al., 2006, 2009, 2012). Dadds argued that the deficit seen in psychopathic individuals is specific to fear. However, other researchers have shown that the eye region is also important for the recognition of sad emotions (Eisenbarth & Alpers, 2011; Hernandez et al., 2009). Therefore, it is possible that individuals high in psychopathy do not pay sufficient attention to the eye region of faces. This impairs their ability to detect cues indicating fear (Adolphs et al., 2005). If this is the case then the eye movement data collected in this study should have shown that the high psychopathy group takes longer to focus on the eye region of the face stimuli and they

should overall have spent less time looking at the eye region compared to the rest of the image and compared to the participants in the low psychopathy group.

The results of this study however showed no differences in eye movement patterns between those high and low in psychopathy. One explanation for these findings could be that the deficits in emotion-processing seen in individuals with high psychopathy traits are not related to attentional deficits associated with the eye region of faces, thereby causing doubt as to whether Dadds' theory is valid. Instead, the findings of this study are in line with Blair's IES because the emotion-processing deficits are thought to be due to amygdala abnormalities and insensitivity to distress cues (Blair, 2005). Within Blair's IES framework, attention is not proposed to differ between individuals with high and low psychopathic traits. Since the current study also found fear and sadness deficits in line with Blair's theory, the absence of attentional abnormalities provides further evidence in the support for an Integrated Emotions System.

Alternatively, it is possible that children with psychopathic traits do in fact have problems focusing on the eye region of faces, causing them to be "fear-blind". Dadds, who demonstrated the "fear-blindness" in his studies, conducted them all with children and adolescents (Dadds et al., 2006, 2009, 2012, 2008; Dadds, Fraser, Frost, & Hawes, 2005; Dadds et al., 2011). Therefore it is possible that this inattention exists in earlier developmental stages but disappears in adulthood as these individuals perhaps adapt new strategies to facilitate the understanding of other people's emotions. It is possible that attentional deficits would be more prominent in forensic settings where psychopathic traits are more pronounced. However, attachment should, according to Dadds, still play a role. However, although attachment to mothers and fathers differed between the high and low

psychopathy groups, attachment did not have a direct or indirect effect on emotion-processing.

As mentioned earlier, attachment security to parents, although capturing differences between the high and low psychopathy groups, may not have been sensitive to emotion processing differences. Those individuals with insecure attachment are not one homogenous group. Instead there are three types of insecure attachment; preoccupied, fearful-avoidant and dismissing-avoidant (Bartholomew & Horowitz, 1991). Niedenthal and colleagues found that these different attachment styles were differentially associated with emotion processing (Niedenthal et al., 2002). Whereas preoccupied individuals seemed to be more sensitive to emotional content, individuals with the avoidant attachment styles seemed to, as implied in the name, avoid emotional content. Therefore it is possible that any effect here was erased due to some insecure individuals being hypersensitive and others hyposensitive to the emotional stimuli. However, this claim needs to be further explored, and will therefore be a focus in the following study.

5.5.3. Charity Dictator Game Results

This study sought to investigate if psychopathic traits in the normal population are related to behavioural indices of prosocial behaviour. Additionally, it was hypothesised that less secure attachment would strengthen the relationship between psychopathic traits and prosocial behaviour, i.e. cause less prosocial behaviour. However, the results showed no associations between psychopathic traits and amount of money donated to the charity. Individuals in the high psychopathy group gave similar amounts of money, hence behaving as prosocial as individuals in the low psychopathy group. This relationship was also not affected by attachment to mothers and fathers nor empathic concern.

Tasks like the Charity Dictator Game assume that prosocial behaviour (i.e. money donation) is a function of feeling empathy or guilt towards the receiver. Although participants in the high and low psychopathy group differed (marginally) in terms of empathy levels and the high psychopathy group had lower levels of guilt (sub-facet of the YPI *CU* factor), these aspects did not impact behaviour. It is possible that empathy did not predict giving behaviour because participants may have rated their own empathy levels higher than they are. This bias could have reduced the chances of finding an effect. However, this is an artefact of all self-report measures. To minimise the social desirability bias participants were told at the beginning of the experiment that they will be given a participant ID number which ensured anonymity. Also the experimenter was not present when the questionnaires were completed to encourage truthful responses.

The question remains why, despite significant differences in psychopathic traits, participants did not differ in terms of donated money? Koenigs et al. (2010) found that individuals with primary psychopathic traits donated less money compared to secondary psychopaths, and non-psychopathic controls during a Dictator Game. However, this study was conducted in a forensic setting where psychopathic traits are more pronounced. A recent study by Berg and colleagues (2013) investigated giving behaviour in students (N=210). Psychopathic traits were measured using the PPI-R. It was found that Coldheartedness (CH) and Self-Centred Impulsivity (SCI) predicted more selfish decisions. Fearless Dominance however was not predictive of giving behaviour. Due to the number of participants in this study it was not possible to examine the relationship between the CH and SCI factor and giving behaviour. However, it seems likely that traits such as Machiavellian egocentricity, rebellious non-conformity (i.e. SCI) and callousness (i.e. CH) would be related to less prosocial behaviour.

Finally, it was investigated if sensitivity to emotional facial expressions was related to prosocial giving in the CDG. Understanding other peoples' emotions, as part of secure attachment, is thought to facilitate the development of conscience (Kochanska & Murray, 2000). Blair (2005) argued that sensitivity to signals of distress (fear and sadness) will activate empathy-related areas in the brain. Therefore it is possible that higher sensitivity to these negative emotions would be related to higher giving behaviour whereas lower sensitivity to fear and sadness would be associated with lower donations. However, this hypothesis could not be substantiated here. The results did not show such a relationship. Although the high psychopathy group showed emotion-processing deficits related to fear and sadness, this did not impact on their prosocial behaviour.

Instead there is a possibility that community samples of individuals with higher psychopathy traits may be more in tune with what is socially acceptable and therefore make more prosocial choices for strategic reasons. They may be aware that donating to charities or volunteering are admirable actions that increase social status. Therefore giving to charity may not be driven by motives of altruism but by motives of improving one's social status, either in their own eyes, or in the eyes of others. It is possible that a person higher in psychopathy who is manipulative and has a grandiose sense of self may use charity work or donations to impress others and make others admire their actions.

5.5.4. Limitations

In this study individuals who scored in the 75th and 25th percentile on the YPI were invited to take part in the experiments. This meant that it was possible to examine emotion-processing and prosocial behaviour in individuals low on the psychopathy continuum and those who are high on the continuum within the normal population. Although this enabled a

good comparison between these individuals it also meant that other factors, such as primary and secondary psychopathic factors, attachment and empathy, could not be used as independent predictors of emotion-processing and prosocial behaviour given that these factors were not continuous across the sample. Additionally, pre-selection of participants reduced the number of eligible participants. Importantly, it should be noted that drop-out rates after the initial selection process were particularly high for the high psychopathy group. This is not surprising – as those high in psychopathy are likely to be lower in Conscientiousness, Agreeableness and higher in lack of remorse and impulsivity – all of which increase the likelihood of a lack of cooperation. In future studies it would be beneficial to use a sample in which psychopathic traits range across a continuum. This will enable the investigation of the direct impact of the psychopathy factors (i.e. primary - Interpersonal, CU- and secondary - Lifestyle) as well as the impact of attachment on emotion-processing and prosocial as well as antisocial behaviour.

Additionally, the current study examined the effect of attachment security to parents on emotion-processing and prosocial behaviour. Although attachment styles (i.e. anxious and avoidant) were also measured, these constructs did not differ significantly between groups. Due to the sample size, the number of predictors in this study had to be kept to a minimum. For these reasons anxious and avoidant attachment were not further investigated. Nonetheless, the low power of some of the analyses in this study means that the findings need to be interpreted cautiously. However, attachment styles are related differently to emotion-processing (Niedenthal et al., 2002) and may hold important information about individuals with psychopathic traits and their emotion-processing deficits. Therefore it would be useful to further examine these attachment styles in future studies.

5.6. CONCLUSIONS

This study demonstrated that within the normal population, individuals with high and low psychopathic traits differ in sensitivity to fearful and sad facial expressions in line with the IES (Blair, 2005). These differences seem, however, not to be due to differences in attention paid to the facial stimuli and is therefore inconsistent with Dadds and colleagues' theory (e.g. 2006, 2008, 2011). Although individuals with high psychopathy traits were found to have less secure attachment to both parents than individuals with low psychopathy traits, attachment security to parents did not affect the relationship between psychopathy and emotion-processing. However, more research is needed to investigate the extent to which specific attachment styles are involved in the processing of emotional content. This will be investigated in the next study.

Prosocial behaviour was measured behaviourally by assessing how much money participants donated to a charity. Psychopathic traits were not related to giving behaviour in this study and were not associated with attachment security, empathy or sensitivity to negative emotions. However, because of the low power of the analyses these findings need to be treated with caution. Although chapter 3 has shown a link between psychopathic traits and antisocial behaviour, this link was assessed psychometrically. Whether or not psychopathic traits are predictive of antisocial tendencies behaviourally is yet to be determined and will therefore be investigated in the next chapter.

CHAPTER 6: RECOGNITION OF FACIAL EXPRESSIONS AND JOY OF DESTRUCTION

6.1. OVERVIEW

The previous chapter investigated emotion-processing differences between individuals with high and low psychopathic traits. Although eye-movement patterns between the low and high psychopathy groups during the emotion-processing task did not differ, differences in terms of sensitivity towards fearful and sad facial expressions were observed. In order to validate these findings, the current study will replicate Study 5. However, since the low and high psychopathy groups did not differ in eye-movement patterns in the previous study, the current study will not include eye-tracking measures.

In Study 5, attachment to parents differed between individuals with high and low psychopathic traits, showing less secure attachment for individuals with higher psychopathic scores. However, attachment to parents did not mediate the relationship between psychopathic traits and emotion sensitivity. What is still unknown, however, is whether it is possible that the mechanisms involved in the emotion-processing deficits seen in psychopathic individuals are more a function of specific attachment styles rather than security to mothers and fathers. In particular, the dismissing-avoidant attachment style has been linked with higher psychopathic traits both in the literature and in Chapter 4 (Lyons-Ruth, 1996). Therefore in the current study it will be tested whether anxious and avoidant attachment and specifically the dismissing-avoidant attachment style affect the relationship between psychopathic traits and sensitivity to facial expressions.

Additionally, the previous study examined behaviour on a prosocial task, but it is still unclear if normal and psychopathic personality traits as well as attachment styles can predict behaviour on a task that measures antisocial behaviour. So far in the thesis, antisocial outcomes have only been measured psychometrically. However, there are few published studies examining the link between psychopathic traits and economic behavioural measures of antisociality, and there is no research on how attachment styles may affect this relationship. In this study, it will therefore be investigated how normal and psychopathic personality traits as well as attachment styles are related to behaviour on an economic antisocial paradigm, the Joy-of-Destruction (JoD) game.

6.2. INTRODUCTION

6.2.1. Replication of the effect of psychopathy on emotion-processing

Research has shown that psychopathy is related to emotion-processing difficulties that present themselves in a range of different ways. Amongst the difficulties is a lower sensitivity in the identification of fearful and sad facial expressions (e.g. Blair, Colledge, Murray, & Mitchell, 2001; Fairchild, Van Goozen, Calder, Stollery, & Goodyer, 2009). Study 5 demonstrated this diminished sensitivity to fearful and sad facial expressions in a student population.

It is yet to be determined if this emotion sensitivity effect is stable and whether the effect is detectable when measuring psychopathic traits dimensionally in a community sample. In Study 5 individuals completed the Youth Psychopathy Inventory (YPI: Andershed et al., 2002) and only participants scoring in the 75th percentile (high psychopathy) and 25th percentile (low psychopathy) were then tested on an emotional facial expression identification task (Face Task). Therefore it is important to examine if the findings from

Study 5 can be replicated and whether this effect is replicable across the wider dimension of psychopathy.

6.2.2. FFM and emotion-processing

Furthermore, as a dimensional approach will be used in this study it is possible to identify how the Five-Factor Model (FFM) personality traits are related to emotion-processing. Neuroticism (N) is typically related to higher sensitivity to negative emotions (Costa & McCrae, 1992a). An fMRI study that investigated the link between N and facial expressions of happy, sad and fearful facial expressions taken from Ekman and Friesen catalogue (Ekman & Friesen, 1976) showed that N was related to greater activity in the medial prefrontal cortex when looking at sad facial expressions (Haas, Constable, & Canli, 2008). These findings suggest greater sensitivity of those with higher levels of N to negative emotions, in particular with regard to stimuli related to sadness.

Low Agreeableness (A) is associated with higher levels of interpersonal conflict. It is possible that this may be because individuals with low levels of A are not as effective in understanding and interpreting other people's emotions as more agreeable individuals are. However, previous studies did not find a significant relationship between A and processing of emotions (Matsumoto & LeRoux, 2000). The current study will, therefore, examine the impact of A on emotion identification sensitivity.

Conscientious individuals may be more effective in understanding emotions of others than individuals who are less conscientious because they are typically more attentive (Fransson et al., 2013). Therefore they may pay more attention to facial cues than individuals who have lower levels of Conscientiousness (C). This notion was supported by Matsumoto and LeRoux (2000). They also found that for effective emotion processing Openness (O) was an

important factor (Matsumoto & LeRoux, 2000). This, they argued, was because people with high levels of O are typically more aware of their surroundings and therefore more likely to pay attention to and be receptive to people and their emotions.

6.2.3. *Attachment styles and emotion-processing*

In the past two chapters the role of attachment in relation to psychopathy has been discussed and investigated. Studies 4 and 5 showed that attachment was less secure for individuals with higher psychopathic traits compared to individuals with lower psychopathic traits. While evidence from the literature suggests that attachment may impact how emotional information is focused upon and interpreted (e.g. Niedenthal et al., 2002; Tucker & Anders, 1999), no such effect was found in Study 5.

There have been a number of studies that investigated the impact of attachment security and attachment styles on emotion-processing. Niedenthal and colleagues showed that the different styles are differently associated to understanding emotions (Niedenthal et al., 2002). *Securely* attached individuals seem to have a good understanding of other people's emotions. This enables them to respond to emotions displayed by others in an appropriate way. *Preoccupied* individuals, in comparison, are highly attuned to negative emotions such as anger, fear and sadness because they strongly desire their partner's approval and will pick up on subtle hints of negativity. Individuals with *fearful-avoidant* attachment typically stay away from close relationships out of fear of rejection. This means they avoid information of emotional content and are therefore not as effective at responding to emotions of others as are securely attached individuals. Lastly, *dismissing-avoidant* individuals feel that they do not need close relationships, typically repress emotions and avoid emotional information by not paying attention to it. Furthermore, Dadds and

colleagues argued that selective attentional preference to the eye region of faces facilitates the attachment bond between infant and caregiver and plays a role in the development of understanding other people's emotions (Dadds et al., 2008, 2011). If this is the case then attachment should be related to emotion-processing in general, showing that less securely attached individuals are worse at identifying emotional facial expressions. However, other evidence suggests that insecure attachment may be linked to higher sensitivity to angry faces (Niedenthal et al., 2002; Pollak & Kistler, 2002) or sad faces (Suslow, Dannlowski, Arolt, & Ohrmann, 2010). However, Niedenthal only examined angry, sad and happy facial expressions and Suslow only used happy and sad faces in their studies to investigate the link to attachment. Therefore it is unclear how attachment is related to fearful expressions.

Pollak and Kistler (2002) used the same experimental set-up as was used in study 5.

However, they did not directly examine attachment but tested children from abusive backgrounds. Therefore it is not clear whether any emotion-processing differences existed for different attachment styles amongst the children tested.

In summary this suggests that individuals with anxious attachment (i.e. preoccupied) should pay more attention to negative emotional stimuli (i.e. oversensitivity) whereas avoidant attachment (i.e. fearful and dismissing) should be related to lower sensitivity to negative stimuli. Due to these different approaches to processing emotional content it seems important to examine individual differences based on the different attachment styles. In study 5, emotion-processing differences between individuals with high and low psychopathic traits were examined based on attachment to parents measured by the Inventory of Parent and Peer Attachment (IPPA) and anxious and avoidant attachment as measured by the Experiences in Close Relationships revised (ECR-r: Fraley et al., 2000). However, levels of anxious and avoidant attachment were found to be similar in the high

and low psychopathy group and therefore no further analysis was conducted. In terms of attachment to parents, although the groups significantly differed (i.e. the high psychopathy group had less secure attachment to mothers and fathers), attachment did not mediate the relationship between psychopathy and emotion-processing. One reason for this finding may be that it is only particular attachment styles that are related to emotion-processing whereas the IPPA measured overall attachment security. Although this was a good measure to capture differences in mother and father attachment, examination of specific attachment styles were not possible.

One question that is still unanswered is whether specific attachment styles may affect the relationship between psychopathic traits and emotion-processing, particularly the dismissing-avoidant attachment style. This style has been linked to antisocial tendencies (Lyons-Ruth, 1996). The Experiences in Close Relationships – revised (ECR-r) used in the previous study did not assess dismissing-avoidant attachment specifically. However, one self-report attachment questionnaire exists that assesses the different attachment styles: the Relationship Scale Questionnaire (RSQ; Griffin & Bartholomew, 1994). It is a continuous measure that assesses attachment in relation to romantic or other close relationships. It is more extensive and more informative than the short Relationship Questionnaire (RQ) that was used in Chapter 4. The RQ only asks participants to rate how much they identify themselves with the four attachment styles. Griffin and Bartholomew proposed using the RSQ to identify 4 attachment styles, secure, fearful-avoidant, preoccupied and dismissing-avoidant attachment with 30 items. However, Simpson et al. (1992) suggested that the RSQ should follow a two-factor structure, similar to the structure of the ECR-r (Fraley et al., 2000) i.e. with an anxious and an avoidant component. Kurdek et al. (2002) investigated the

RSQ with regard to the different factor structures and confirmed that Simpson's anxious and avoidant structure was the only model that had adequate fit.

Nonetheless, since the dismissing-avoidant attachment style is related to antisocial outcomes (Lyons-Ruth, 1996), it would be useful to examine how psychopathic traits and related outcomes are associated with dismissing-avoidant attachment. Therefore in keeping with Kurdek's findings, in this study the RSQ will be used to assess anxious and avoidant attachment. As the RSQ also contains a dismissing-avoidant scale, this scale will be used, depending on an acceptable level of internal reliability, to investigate its link to psychopathic traits and the effect on emotion-processing and antisocial outcomes.

6.2.4. Behavioural measures of antisocial behaviour

So far in this thesis, psychopathic traits and FFM personality traits have been examined with regard to antisocial outcomes such as alcohol use and aggression. In Study 5 this investigation was extended to prosocial outcomes in terms of money donations to a children's charity. Antisocial outcomes to this point have been measured and investigated only by psychometric means. Self-report measures have certain great advantages but also certain limitations. The advantages are, for example, that we can ask questions about real-life behaviours that cannot necessarily be measured in the laboratory (e.g. "How often have you damaged things because you felt mad"). Surveys can also cover a larger range of behaviours, they are anonymous and fairly quick to complete. However, participants do not always answer these questions correctly for one reason or another, perhaps because they are ashamed, want to adhere to social norms or certain questions may not apply to them. Behavioural measures of antisocial tendencies can therefore be useful, direct and arguably more objective methods of capturing individual differences without some of the biases

found in questionnaires. There are numerous types of tasks that explore antisocial behaviour and the next section will discuss considerations about some of these tasks in order to explore which may be the most suited task for the research within this thesis.

One commonly used antisocial behaviour task is the Taylor reaction time paradigm which looks specifically at aggressive behaviour (Taylor, 1967). In this task participants believe they are playing a reaction time game against an opponent. This opponent can either be real or bogus. After winning a trial, the winner can administer a noxious stimulus of a chosen magnitude to the opponent (e.g. sound blast). The task is set up in a way to induce aggression by means of invoking no, moderate and high levels of provocation. The aggressive behaviour is operationalised as the magnitude of administered sound blasts to the opponent on a scale from 0-8 (no sound blast to 90dbs). The Taylor paradigm is frequently used in studies investigating provoked aggression (e.g. Dambacher et al., 2014; Lawrence & Hutchinson, 2013) and has been validated in different settings (Giancola & Chermack, 1998; Giancola & Parrott, 2008). However, behaviour on this task may also be a function of other factors such as competitiveness (see Tedeschi & Quigley, 1996, 2000). Additionally, it is argued that participants in the Taylor paradigm would perhaps choose other means of reacting to the provocation if they had the choice. Being left with only the option to administer sound blasts (or shocks) this set up can be too inflexible for some individuals in that they cannot respond as they would naturally do.

Another task that unlike the Taylor paradigm does not use induced provoked aggression, originated from the field of behavioural economic games; the Dictator Game (DG).

Numerous versions of this task exist and the previous chapter (section 5.2.3.) briefly outlines the game. In sum, two players of which only one makes the decisions (the dictator) decides how to split a certain amount of money between him-or herself and the other player. The

other player has no impact on the dictator's decision. Dictator games give insight into individuals' choices in terms of what amount they consider fair to give themselves and how much to give others. One disadvantage of using this task as a means of measuring antisocial behaviour is that the dictator may feel that his actions are morally justified. For instance, giving a very small amount of money to the other player may seem unjust to the observer. However, the dictator may perceive his actions as generous considering that he could have chosen to keep all the money to himself. Therefore this person's perception of his own action would not be antisocial, hence making the task somewhat ambiguous to interpret.

6.2.5. Joy-of-Destruction (JoD) game

Another task that measures antisocial behaviour directly, the Joy-of-Destruction (JoD) game (Abbink & Herrmann, 2011; Abbink & Sadrieh, 2009), is a two-player game in which each player is given the same amount of money. The players openly decide whether they want to reduce the other player's money whose identity is unknown. In a second condition the player's decision is hidden by also having each player take a card from a deck of coloured cards without them knowing the content of the card. Each colour on the card represents a different level of money reduction, including no reduction. Therefore at the end of the game the players do not know whether a reduction of their own money was due to the other player's decision to burn their money or due to the random card. There are a series of decisions the players have to make and "burning" money occurs at no cost for the "money burner". No player gains money through their decision at any point, hence removing the reciprocity aspect that can be a problem for other behavioural economic games. For instance, in some games, such as the Taylor paradigm, players may think their decisions could affect other players' actions later in the game and therefore making reciprocity a potential reason for their behaviour.

In the JoD game, each player's action also has real-life consequences as their decision will affect how much money the other person will take away from the game. Lastly, making the decision to reduce the other player's money has no other benefit to the participant. The game therefore acts as a relatively pure measure of antisocial behaviour as opposed to games such as the DG. As such, this game is a good behavioural measure of antisocial behaviour with the added benefit that reciprocity expectations should be eliminated.

The JoD game was tested originally in Dutch university students (Abbink & Sadrieh, 2009). The game was played over a number of rounds whereby participants had to make decisions about whether or not to burn their partner's money after each round. Abbink found that on average participants burned money almost 40% of the time *if* their decision was hidden (Abbink & Sadrieh, 2009). In a later version of the task, the one-shot version (mini-JoD) players were endowed with 10 monetary units (MU) and could, for a small fee of 1MU reduce their partner's money by 5MU (Abbink & Herrmann, 2011). In the mini-JoD participants were told that there is a 1-in-3 chance that they would lose 5MU anyway which would be decided by die roll. This acted as hidden treatment condition as the players did not know if their money was reduced by chance or because of the other player. This study was conducted with Ukrainian students and it was found that almost 26% of players burned the other player's money in the hidden condition. When the decision to burn or not to burn was open for others to see, only 10% of people burned money. Similar results have been obtained for the mini-JoD by different researchers, using samples from different cultures (Baillon, Selim, & van Dolder, 2013; Prediger, Volland, & Herrmann, 2014). It is this one-shot version of the task, the mini-JoD, which will be used in the current study because of its fast and simple execution.

To date, it is not clear how individuals with high psychopathic traits would behave on the mini-JoD and there is also no previous evidence on the relationship between the mini-JoD and FFM personality traits. The “pleasure of being nasty” is how the authors of the JoD describe the game (Abbink & Sadrieh, 2009). In line with Prediger et al. (2014), “nastiness” shall be defined as making decisions that have negative consequences for another person despite personal costs with no motives of reciprocity. This definition is most aligned with the *Callous/Unemotional* (CU) factor of psychopathy that captures remorselessness and being uncaring and cold-hearted. Therefore this factor is the strongest candidate for being predictive of money burning on the mini-JoD. Based on the findings in this thesis, the *CU* factor of the YPI is associated with low A and low C. Therefore it is possible that individuals with low levels of A and C will be more likely to burn money than individuals with higher levels of A and C. However, at least in Dictator Games (DGs) that look at prosocial behaviour, A and C seem to be unrelated to the choices, whether prosocial or not (Brocklebank, Lewis, & Bates, 2011). Therefore no specific predictions are made. On the other hand, Brocklebank and colleagues found that Extraversion (E), Neuroticism (N) and Openness (O) were related to behaviour on the DGs.

Individuals with lower levels of Extraversion (E) were found to be more generous on DGs than individuals who were more extroverted (Brocklebank et al., 2011). It is possible that these individuals with lower levels of E will also be less likely to burn their partner’s money. Brocklebank and colleagues also found that it was the individuals with lower levels of N that were more likely to be prosocial (2011). Therefore no specific predictions are made about N and antisocial tendencies on this task. Lastly, in the same study O was positively related to prosocial behaviour and hence it is expected that money burning will be negatively associated with O in this study.

6.2.6. *Current Study*

The first aim of this study is to replicate the Face task in the same format as was used in Chapter 5 to examine if the behavioural differences in emotion sensitivity between individuals with different levels of psychopathic traits found in Chapter 5 are stable across experiments and if these findings persist when psychopathy is measured in a dimensional way. Eye-movements, however, will not be recorded.

The second aim of this study is to employ a behavioural measure of antisocial tendency alongside psychometric measures of antisocial behaviour in order to investigate if normal and psychopathic traits relate to behaviour on this task in accordance with theoretical predictions. The mini-JoD game will be used for this purpose. To our knowledge there is no published journal article that has used the JoD game in the context of psychopathic traits to investigate antisocial tendencies. Therefore this task will be used to explore how normal and psychopathic personality traits are related to 'nastiness'. Normal personality traits will be measured using the NEO-FFI and psychopathic traits using the YPI, consistent with the measures in the previous studies in this thesis.

Whereas in the mini-JoD used by Abbink and Herrmann (2011) participants had one fixed amount of money: monetary units (MU) they could burn, in the current study participants will have the choice of 3 different amounts they can burn should they wish to; 2, 3 or 4 MU. This change was made because research shows that options affect participants' choices (Bardsley, 2008). If participants know that they can reduce their partner's money by three different amounts they may be more likely to engage in that behaviour than if it is an all-or-nothing task in which the only amount that can be burned is 5MU. Additionally, variations in the amount of the behaviour can be measured.

Self-reported proactive and reactive aggression and alcohol use will also be measured again to examine if normal and psychopathic traits predict these outcomes in accordance with the previous findings in this thesis.

The third aim of this study is to investigate if anxious and avoidant attachment styles as measured by the RSQ as well as the dismissing-avoidant attachment style (depending on acceptable internal consistency) are related to psychopathic traits, affect sensitivity to emotional facial expressions and predict antisocial tendencies both psychometrically and behaviourally. Lastly, it will be investigated if attachment styles affect the relationship between psychopathic traits and both emotion-processing and behaviour on the JoD game.

6.2.6.1. Hypotheses

For the *Face task* it is predicted that psychopathic traits will be associated with lower sensitivity to fearful and sad facial expressions. As concluded in Dawel's meta-analysis (2012), it is not certain whether this emotion-processing deficit is specifically related to the *CU* factor (i.e. affective) as findings are mixed. It is further hypothesised that low *A* and low *C*, which are related to psychopathy will also be associated with lower sensitivity to fearful and sad facial expressions. High *N* should be related to stronger sensitivity to sad facial expressions (Haas et al., 2008).

According to the literature avoidant attachment and the dismissing-avoidant attachment style are related to a tendency to avoid emotional content as processing and coping with emotions, particularly negative emotions, is difficult for them (Niedenthal et al., 2002).

However, the literature is divided as to whether emotion-processing deficits are general or specific to certain negative emotions. Therefore no specific predictions are made for avoidant and anxious attachment and the dismissing-avoidant attachment style.

For the *Mini-JoD* we expect that individuals with higher psychopathic traits will be more likely to burn their partner's money than individuals with lower psychopathic traits, particularly the *Callous/Unemotional* (CU) factor of the YPI. A study that examined psychopathic traits in relation to behaviour on prison dilemmas found that Machiavellian Egocentricity, related to grandiose sense of self and manipulation, was associated with less cooperation on the task (Curry, Chesters, & Viding, 2011). Therefore it is possible that burning money in the mini-JoD will also be associated with the psychopathy facets *grandiose sense of self* and *manipulation* (Interpersonal factor of the YPI).

It will also be explored how the FFM traits will be related to money burning. Since there is only a limited number of studies that linked FFM traits and behaviour in economic games no specific predictions are made in relation to money burning.

Those individuals who also score high on the dismissing-avoidant attachment style are expected to be more likely to burn money than individuals who do not score high on this attachment style.

Burning money on the mini-JoD task is also expected to be related to lower sensitivity to negative emotions on the facial expression task showing that diminished understanding of emotions makes individuals more likely to be antisocial.

Alcohol use. Similarly to findings in Chapter 3 it is predicted that increased alcohol use will be associated with higher scores on the YPI *Lifestyle* factor. Individuals with higher levels of E and N and lower levels of C are also predicted to show more alcohol use behaviour than individuals on the other end of the personality continuum.

Proactive and reactive aggression. Based on the findings in Chapter 3 it is predicted that the Interpersonal factor of the YPI will be related to both proactive and reactive aggression.

Similarly, low levels of A are also predicted to be related to more proactive and reactive aggression. Individuals with higher levels of N may also be more reactively aggressive than individuals with lower levels of N.

6.3. METHOD

6.3.1. *Participants*

University of Nottingham undergraduate students were invited to take part in this study. Students were contacted via emails sent to the university departments, Personality, Social Psychology and Health (PSPH) participant pool and through posters that were distributed around the campus. A total of 103 participants were tested (62 females, 41 males $M=19.2$ years, $SD=.84$). Participants were included if they were aged between 17-21 years.

6.3.2. *Measures*

NEO-Five Factor Inventory see Chapter 2 (section 2.2.2. *Measures*).

Youth Psychopathy Inventory see Chapter 3 (section 3.2.1.2. *Measures*).

Reactive-Proactive Aggression questionnaire see Chapter 3 (section 3.4.1.2 *Measures*).

Alcohol Use Disorders Identification Test see Chapter 3 (section 3.4.1.2 *Measures*).

Autism Spectrum Quotient 10 see Chapter 5 (section 5.3.2 *Measures*).

Relationship Scale Questionnaire (RSQ: Griffin & Bartholomew, 1994). This attachment questionnaire aims to capture individuals' attachment style based on their responses on a 30-item measure (Appendix 6.2.). It assesses attachment in relation to romantic or other close relationships. Griffin and Bartholomew (1994) proposed using the RSQ to identify 4 attachment styles; secure, fearful, preoccupied and dismissing-avoidant attachment. Secure

and dismissing-avoidant attachment are comprised of 5 items each, fearful and preoccupied attachment are comprised of 4 items each on a 5-point Likert scale. However, Simpson et al. (1992) suggested a two-factor structure with an anxious and an avoidant component, similar to the ECR-r (Fraley et al., 2000). Kurdek et al. (2002) investigated the different factor structures and found that Simpson's two-factor structure was the only model that had adequate goodness-of-fit. However, because this scale does not directly tap into dismissing-avoidant attachment we calculated anxious and avoidant attachment according to Simpson et al. (1992) as well as the four attachment styles according to Griffin and Bartholomew (1994) with only the dismissing-avoidant style being used for analysis.

6.3.3. Tasks

6.3.3.1. *Mini-Joy of Destruction game*

The instructions of the mini-JoD were taken from the original mini-JoD game by Abbink and Herrmann (2011). Each player was randomly paired with another player whose identity was not revealed. They started the game with an initial endowment of 10 MU. They then had to decide if they wanted to reduce the other player's money. The game differed in two aspects from the original game. First, in the current task no open treatment condition was used. The one-shot game was played as hidden condition with a die roll as potential reason for monetary loss as means of concealing the true decision of the participant (see Appendix 6.2. for Instructions).

Second, participants were not restricted to burning a fixed amount of 5 MU but instead could choose between 3 amounts (2 MU, 3 MU or 4 MU). Therefore participants had to make potentially 3 decisions: whether or not to burn their partner's money; if so what amount; and lastly whether or not they thought their partner burned their money. After

these decisions were made participants were told about the die roll. At the end of the game participants' earned MU were displayed on the screen for no other player to see. The experimenter noted down the amount and participants were paid out the money individually at the end of the study.

6.3.3.2. *Face task*

As in Chapter 5 the emotional facial expression task (Face task) included the same stimuli (see 5.3.3 Materials) and followed the same procedure (see 5.3.4.2 *Face Task*).

6.3.4. *Procedure*

On entering the lab participants were placed on computers in separate cubicles. It had to be ensured that participant numbers were always even and that there were always a minimum of four players to ensure an anonymous allocation of players. All participants first read the information sheet and filled in the consent form (see Appendix 6.1.). Participants initially completed the mini-JoD. After the mini-JoD participants filled in the NEO-FFI on paper, the remaining questionnaires on the computer via SurveyMonkey and completed the Face task using PsychoPy software. The order of paper questionnaires, online survey and the task was randomised.

6.3.4.1. *Data analysis*

For the *Face task* the Perceived Subjective Equality (PSE) was calculated as described in Chapter 5 (see section 5.3.5). This is a measure of the participants' sensitivity to the emotional expressions. The Just Noticeable Difference (JND) was also measured to identify how certain participants are that an image portrays a certain emotion and is the slope of the logistic function (see Chapter 5, section 5.3.5).

Proactive aggression, as in previous chapters, was positively skewed with 51% of participants scoring zero. Therefore this variable was categorised into the variable *proactive* whereby individuals with a score of 0 were classed as not proactively aggressive and those with a score above 0 were classed as proactively aggressive to some degree. Tests of normality showed that the YPI higher-order factor *CU* as well as the sub-facet callousness, remorselessness and irresponsibility were not normally distributed. The dismissing-avoidant attachment style also did not follow a normal distribution. For these variables non-parametric tests were carried out where appropriate.

6.4. RESULTS

6.4.1. Face Task

In this study the facial expression identification task that was used in Chapter 5 was employed to examine if the findings in Chapter 5 can be replicated. There it was found that individuals with higher psychopathic traits were less sensitive to fearful and sad facial expressions than individuals with lower psychopathic traits. In the current study psychopathy was measured on a continuous level. The relationship between psychopathic traits and sensitivity to facial expressions, measured as perceived subjective equality (PSE), was measured by fitting the behavioural data to logistic functions.

The four conditions were angry-sad, happy-sad, angry-fearful and fearful-happy. Of these outcome variables the PSE fearful-happy (PSE_{fh}) was not normally distributed. For each of these variables if the score is high this means the threshold to judge the first mentioned emotion is high (i.e. angry-sad condition with a high PSE_{as} score means that the threshold to identify the emotion as angry was high).

Pearson's r and Spearman's ρ correlations were conducted for these outcome variables and psychopathy traits, FFM personality traits and attachment. The correlations between autism scores as measured by the AQ10 and the PSE variables were also examined (see Table 6.1.).

None of the YPI factors were significantly correlated with the emotion conditions (see Table 6.1). Sensitivity to faces in the fearful-happy condition (PSEfh) was found to be significantly positively correlated with O. These individuals saw more of the facial expressions in this condition as happy than individuals with lower levels of O. PSHfh was also significantly correlated with avoidant attachment. However this relationship was negative. Individuals with higher scores on the avoidant attachments scale showed a higher sensitivity to fearful faces than individuals who had lower avoidant attachment scores.

Dismissing-avoidant attachment was significantly positively correlated with PSE angry-fearful (PSEaf). Participants who scored higher on dismissing-avoidant attachment were more sensitive towards fearful facial expressions compared to individuals who scored lower on this attachment style.

Table 6.1 Correlation coefficients for sensitivity to facial expressions

Factors	PSEas	PSEhs	PSEaf	<i>PSEfh</i>
YPI Interpersonal	.01	.17	-.09	.01
YPI CU	-.02	.14	-.14	-.10
YPI Lifestyle	-.07	.01	.01	.02
FFM				
O	.02	-.17	-.01	.26*
C	-.06	-.01	-.07	.13
E	.05	-.02	-.02	.08
A	.01	-.18	.13	.11
N	-.15	-.02	-.02	-.02
Attachment				
Avoidant	-.06	.08	.02	-.21*
Anxious	-.17	.02	-.09	-.01
Dismissing	.01	-.01	.24*	.12
AQ10	.04	.19	-.07	-.22

Note. PSE= Perceived Subjective Equality; YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional; FFM= Five-Factor Model; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; AQ= Autism Quotient.

* $p < .05$; ** $p < .01$.

In addition to measuring sensitivity to facial expressions, we also analysed the data in terms of response consistency by measuring the Just Noticeable Difference (JND). The JND variables for the four conditions were not normally distributed. The correlations in Since the results showed that JNDas was significantly correlated to C and dismissing-avoidant attachment a hierarchical regression analysis was computed for these variables in order to test the extent to which these variables predicted categorisation in the angry-sad condition. Sex entered in the first step as there is some evidence showing differences in emotion-processing between males and females (see Brook, Brieman, & Kosson, 2013).

Table 6.2 showed that JND angry-sad (JNDas) significantly and positively correlated with C. Higher levels of C were related to clearer categorisation between angry and sad facial expressions.

Higher dismissing-avoidant attachment meant being less certain of whether faces showed angry and sad facial expressions.

Since the results showed that JNDas was significantly correlated to C and dismissing-avoidant attachment a hierarchical regression analysis was computed for these variables in order to test the extent to which these variables predicted categorisation in the angry-sad condition. Sex entered in the first step as there is some evidence showing differences in emotion-processing between males and females (see Brook, Brieman, & Kosson, 2013).

Table 6.2 Correlation coefficients for response consistency

Factors	<i>JNDas</i>	<i>JNDhs</i>	<i>JNDaf</i>	<i>JNDfh</i>
YPI Interpersonal	.10	.03	.16	.20
<i>YPI CU</i>	.20	.19	.09	.15
YPI Lifestyle	-.06	.10	.12	.15
FFM				
O	.07	-.11	.01	.03
C	.24*	-.03	.01	-.08
E	.01	-.07	.04	.01
A	-.12	.04	-.06	-.16
N	-.06	-.04	-.07	.10
Attachment				
Avoidant	.08	.08	-.02	.10
Anxious	.07	-.04	.05	.12
<i>dismissing</i>	-.23*	.06	-.18	-.03
AQ10	-.01	.07	-.08	-.11

Note. JND= Just Noticeable Difference; YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional; FFM= Five-Factor Model; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; AQ= Autism Quotient; YPI lower-order facets in *italics*.

* $p < .05$; ** $p < .01$.

However, in this sample sex did not have a significant effect in the regression model ($p > .05$). Therefore this first step was removed and a simple linear regression model was computed. This model showed a significant fit (see Table 6.3).

Table 6.3 Linear regression model for response consistency on the angry-sad condition

Model	JND angry-sad		
	B	SE B	β
<i>C</i>	.38	.22	.17
Dismissing attachment	-.43*	-.20	-.22
R^2	.12		
F for change in <i>R</i>	3.82*		

Note. C= Conscientiousness.

* $p < .05$.

Lower levels of dismissing-avoidant attachment significantly predicted higher JND scores meaning that less dismissing-avoidant individuals were more certain whether an expression

was angry or sad than individuals who were more dismissing-avoidant. C was no longer a significant predictor of JNDas.

6.4.2. Mini-JoD game

The aim was to investigate which of the factors measured in this study are significantly related to whether participants burned money or not. Overall, 17 participants burned money (18%), whereas 86 (82%) did not. Table 6.4 shows that individuals who burned money typically had slightly higher psychopathic traits than individuals who did not burn money. Participants who burned money also tended to have lower levels of N and A. In terms of attachment, those who did not burn money had slightly higher anxious, avoidant and dismissing-avoidant attachment than participants who burned money.

T-tests, Mann-Whitney U tests and Chi-Square tests were carried out for normally distributed data, non-normal data and categorical data, respectively. The results are presented in Table 6.4. None of the measured traits were significantly related to burning choice.

Table 6.4 Summary of comparisons on the mini-JoD game

Burn decision Variables	Yes (N=17) M (SD)	No (N=86) M (SD)	T-test, Chi-Sq or Mann-Whitney	p value
YPI Interpersonal	2.04 (.43)	1.96 (.48)	$t = -.66$	.51
YPI CU	1.99 (.46)	1.86 (.46)	$U = 864.5$	.24
YPI Lifestyle	2.17 (.29)	2.18 (.43)	$t = .05$	.96
FFM				
N	2.12 (.70)	2.16 (.73)	$t = .168$	.87

E	2.35 (.67)	2.31 (.58)	$t = -.23$	.82
O	2.45 (.58)	2.54 (.52)	$t = .64$	.52
A	2.42 (.65)	2.60 (.60)	$t = 1.07$	.29
C	2.59 (.62)	2.55 (.65)	$t = -.21$	.83
Attachment				
Avoidant	2.57 (.72)	2.70 (.66)	$t = .78$	.44
Anxious	2.45 (.93)	2.54 (.91)	$t = .37$	.71
Dismissing-avoidant	3.12 (.79)	3.38 (.66)	$U = 558.0$	.12
AUDIT total	9.53 (6.76)	7.37 (.5.83)	$t = -1.36$	.18
Reactive aggression	.71 (.41)	.61 (.34)	$t = -1.07$	.29
Proactive aggression				
Yes	11	39	$X = 2.13$	.15
No	6	47		
AQ10	3.45 (2.07)	3.11 (1.88)	$t = -.54$	.59

Note. YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional; FFM= Five-Factor Model; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; AUDIT= Alcohol Use Disorder Identification Test.

6.4.3. Aggression

First, zero-order correlations were computed for the YPI factors, FFM personality traits, attachment, and reactive aggression (see Table 6.5).

In order to identify the extent to which psychopathic traits (Model 1) and standard personality traits (Model 2) are linked to reactive aggression, simple linear regression analyses were computed (see Table 6.5.) on the traits that were significantly correlated with

reactive aggression. The results of Model 1 showed that individuals who scored high on the YPI *Interpersonal* scale were more reactively aggressive than individuals with lower scores on the YPI *Interpersonal* scale. The YPI *Lifestyle* factor did not predict reactive aggression in this sample. In Model 2 low A significantly predicted reactive aggression whereas N did not.

Table 6.5 Linear regressions with YPI factors and FFM traits as predictors of reactive aggression

	Reactive aggression		
Model 1	B	SE B	β
<i>Interpersonal</i>	.27***	.08	.36
<i>Lifestyle</i>	.15	.09	.17
Adjusted R^2	.19		
F for change in R	13.28***		
Model 2			
<i>N</i>	.08	.04	.16
<i>A</i>	-.25***	.05	-.43
Adjusted R^2	.22		
F for change in R	15.20***		

Note. N= Neuroticism; A= Agreeableness.

*** $p < .001$.

Next, in order to examine if the FFM traits could predict reactive aggression above and beyond psychopathic traits, a hierarchical regression analysis was performed with the YPI *Interpersonal* and *Lifestyle* factors in step 1 and A and N in step 2. The results showed that the model was significant in both steps. In step 1 the *Interpersonal* factor significantly predicted reactive aggression whereas the *Lifestyle* factor did not (see Table 6.6.). Higher scores on the *Interpersonal* factor predicted increased reactive aggression.

In the second step the results indicated that A, in addition to the *Interpersonal* factor, significantly negatively predicted reactive aggression. Lower levels of A were related to increased levels of reactive aggression.

Table 6.6 Hierarchical regression with YPI factors and FFM traits as predictors of reactive aggression

Model	Reactive aggression	B	SE B	B
Step 1	<i>Interpersonal</i>	.27***	.08	.36
	<i>Lifestyle</i>	.15	.09	.17
	Adjusted R^2	.19		
	F for change in R	13.28***		
Step 2	<i>Interpersonal</i>	.19*	.09	.25
	<i>Lifestyle</i>	.10	.09	.11
	N	.07	.04	.14
	A	-.18**	.06	-.30
	Adjusted R^2	.28		
	F for change in R	7.30***		

Note. N= Neuroticism; A= Agreeableness.

** $p < .01$; *** $p < .001$.

Next we examined the extent to which the YPI higher-order factors (Model 1) and FFM personality traits (Model 2) predicted proactive aggression (see *Table 6.7.*). This was done using logistic regression models. First the psychopathy factors and FFM traits were entered in two separate analyses. Model 1 showed that the YPI factor *Lifestyle* significantly predicted proactive aggression. For every 1-unit increase on the *Lifestyle* factor individuals were 5 times more likely to be proactively aggressive. The YPI *Interpersonal* and *CU* factors were not found to be related to proactive aggression.

Model 2 showed that E was significantly positively related to proactive aggression whereas A and C were negatively related to this type of aggression.

Table 6.7 Logistic regression models for proactive aggression and YPI factors as well as FFM traits

Model 1	B	SE B	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
Constant	-5.48	1.55		.01	
YPI Interpersonal	.58	.56	.59	1.78	5.36
YPI CU	.39	.53	.52	1.47	4.17
YPI Lifestyle	1.63**	.62	1.50	5.11	17.35
$R^2 = .14$ (Cox&Snell), $.19$ (Nagelkerke). Model $X^2(3) = 16.02$, $p < .001$.					
Model 2					
Constant	5.77	2.37		321.33	
N	.30	.37	.65	1.35	2.81
E	1.48**	.49	1.67	4.40	11.57
O	-.61	.53	.19	.54	1.52
A	-2.30***	.54	.04	.10	.29
C	-.97*	.45	.16	.38	.91
$R^2 = .31$ (Cox&Snell), $.41$ (Nagelkerke). Model $X^2(5) = 38.07$, $p < .001$.					

Note. YPI= Youth Psychopathy Inventory; CU= Callous/Unemotional; N= Neuroticism; E= Extraversion; O= Openness; A= Agreeableness; C= Conscientiousness.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Thereafter a hierarchical logistic regression was conducted to identify if E, A and C predicted proactive aggression above and beyond the YPI Lifestyle factor (see *Table 6.8*). Here it was found that the Lifestyle factor no longer significantly predicted proactive aggression. E and A were the only significant predictors in this model showing that individuals with higher levels of E and lower levels of A were more likely to be proactively aggressive.

Table 6.8 Hierarchical logistic regression with proactive aggression as outcome and Lifestyle and E, A and C as predictors

Model	B	SE B	95% CI for Odds Ratio		
			Lower	Odds Ratio	Upper
Constant	2.92	2.59		18.52	
YPI Lifestyle	.92	.79	.54	2.52	11.82
E	1.11*	.51	1.13	3.05	8.24
A	-2.25***	.55	.04	.11	.31
C	-.69	.50	.19	.50	1.33

$R^2 = .31$ (Cox&Snell), $.41$ (Nagelkerke). Model $X^2(3) = 24.21$, $p < .001$.

Note. YPI= Youth Psychopathy Inventory; E = Extraversion; A= Agreeableness; C= Conscientiousness.

* $p < .05$; *** $p < .001$.

6.4.4. Alcohol

Another aim of this study was to replicate previous findings that looked at the predictive value of psychopathic and normal personality traits with regard to alcohol use. Therefore linear regression models were computed for YPI factors (Model 1) and FFM traits (Model 2) that were significantly correlated with alcohol use (Table 6.9). For YPI factors Model 1 showed that YPI *Lifestyle* significantly predicted AUDIT total scores. Individuals with higher scores on the YPI *Lifestyle* scale engaged in more alcohol use behaviours. Scores on the YPI *Interpersonal* factor had no significant effect on alcohol use.

It was also found that both N and E significantly predicted alcohol use in Model 2.

Individuals with higher levels of N and E drank more alcohol than individuals with lower levels of these traits.

Table 6.9 Linear regressions with YPI factors and FFM traits as predictors

AUDIT total scores			
Model 1	B	SE B	β
<i>Interpersonal</i>	2.26	1.31	.18
<i>Lifestyle</i>	4.48**	1.51	.30
Adjusted R^2	.15		
F for change in R	10.25***		
Model 2	B	SE B	β
<i>N</i>	2.40**	.79	.29
<i>E</i>	2.95**	.96	.29
Adjusted R^2	.12		
F for change in R	7.70***		

Note. AUDIT= Alcohol Use Disorder Identification Test; N= Neuroticism; E = Extraversion.

** $p < .01$; *** $p < .001$.

Lastly it was investigated if the FFM traits predicted alcohol use above and beyond the YPI factors. A hierarchical regression analysis was computed with the YPI *Interpersonal* and *Lifestyle* factor in step 1, followed by E and N in step 2. These variables were found to be significantly correlated with the AUDIT total score. The results showed that the model and both steps were significant (see Table 6.10.). Step 1 showed that the YPI *Lifestyle* factor was a significant predictor of AUDIT total scores, indicating that higher scores on the *Lifestyle* factor were related with increased alcohol use behaviour. The YPI *Interpersonal* factor of the YPI was not significantly related to alcohol use in this sample.

In the second step *Lifestyle* no longer predicted alcohol use behaviour ($p = .06$). However, both N and E significantly predicted alcohol use. Those individuals with high levels of N and E had higher levels of alcohol than individuals with lower levels of N and E.

Table 6.10 Hierarchical regression with AUDIT total scores as outcome and YPI factors and FFM traits as predictors

Model	AUDIT total scores	B	SE B	β
Step 1	<i>Interpersonal</i>	2.26	1.31	.18
	<i>Lifestyle</i>	4.48**	1.51	.30
	Adjusted R^2	.15		
	F for change in R	10.25***		
Step 2	<i>Interpersonal</i>	2.32	1.28	.18
	<i>Lifestyle</i>	2.98	1.57	.20
	N	1.79*	.79	.22
	E	1.98*	.97	.20
	Adjusted R^2	.20		
	F for change in R	3.64*		

Note. AUDIT= Alcohol Use Disorder Identification Test; N= Neuroticism; E = Extraversion.

** $p < .01$; *** $p < .001$.

Lastly, *Table 6.11*. shows that attachment avoidance, attachment anxiety and the dismissing-avoidant attachment style were not related to either aggression or alcohol use.

Table 6.11 Correlation coefficients for YPI factors, FFM traits, attachment, aggression and alcohol use

Factors	α	1	2	3	4	5	6	7	8	9	10	11	12
1. YPI <i>Interpers.</i>	.90	-											
2. YPI <i>CU</i>	.84	.46**	-										
3. YPI <i>Lifestyle</i>	.80	.45**	.20*	-									
4. O	.68	.16	-.17	.07	-								
5. C	.86	-.07	.05	-.52**	-.06	-							
6. E	.83	.17	-.11	.25*	.20*	.21*	-						
7. A	.82	-.44**	-.40**	-.24*	.08	.21*	.29**	-					
8. N	.85	.03	-.26**	.34*	.09	-.38**	-.21*		-				
9. RPQ Reactive	.81	.43**	.11	.33**	.13	-.14	.01	-.46**	.22*	-			
10. AUDIT total	.79	.31**	.06	.38**	.11	-.07	.23*	-.15	.23*	.26**	-		
11. Avoidant	.74	.05	.36**	-.02	-.12	-.09	-.41**	-.29**	.22*	.09	-.14	-	
12. Anxious	.79	.13	-.09	.20*	.08	-.27**	-.03	-.05	.50**	.06	.09	.14	-
13. dismissing	.60	-.02	.21*	.007	.14	.05	-.25*	-.06	.04	.02	-.16	.45**	.05

Note. YPI= Youth Psychopathy Inventory; O= Openness; C= Conscientiousness; E= Extraversion; A= Agreeableness; N= Neuroticism; RPQ= Reactive and Proactive Aggression Questionnaire; AUDIT= Alcohol Use Disorders Identification Test.

* $p < .05$; ** $p < .01$; *** $p < .001$.

6.5. DISCUSSION

In this final study, a number of unanswered questions were addressed. Study 5 examined groups with high and low psychopathic traits and showed reduced sensitivity to fearful and sad facial expressions in the high psychopathy group. The aim of the current study was to examine if this effect was replicable and could be demonstrated using psychopathy as a dimensional measure. It also investigated how FFM personality traits were related to emotion-processing, especially with regard to fearful and sad expressions.

The next aim was to further investigate what role attachment played in psychopathy as attachment may be one of the underlying mechanisms related to emotion-processing difficulties seen in psychopathy that lead to antisocial behaviour. In this study the focus was placed on anxious and avoidant attachment as well as the dismissing-avoidant attachment style and their relationship to psychopathy and emotion-processing examined.

So far in this thesis, normal and psychopathic personality traits were investigated with regard to psychopathy-related outcomes such as aggression and alcohol use which were assessed psychometrically. In Chapter 5 this was extended to include a behavioural measure of prosocial behaviour. However, what had not yet been investigated was the relationship between normal and psychopathic traits and antisocial tendencies in a behavioural experiment. Therefore the current study used a task borrowed from the behavioural economics literature, the Joy-of-Destruction game, to investigate antisocial behaviour. If self-report measures of psychopathy in non-forensic settings relate to self-report measures of antisocial behaviours, we predicted that such psychopathy measures should also be related to actual measurable behaviours linked to antisociality. Similarly we predicted that

these measurable behaviours are associated with normal personality traits that are related to psychopathy.

Attachment was also examined within this context. Following the same rationale as described above, if self-report measures of attachment are related to antisocial tendencies we anticipated that they should also be related to behavioural measures of antisocial tendencies. Furthermore it was investigated whether anxious and avoidant attachment as well as the dismissing-avoidant attachment impacted the relationship between psychopathic traits and behaviour on the JoD game.

Lastly, normal and psychopathic personality traits were investigated with regard to aggressive behaviour and alcohol use. This was done to examine if the findings in Chapter 3 are replicable and show that psychometrically psychopathic traits and psychopathy-related outcomes as measured in a community sample are associated with each other.

The findings from within this study will be discussed according to function in the sections following below.

6.5.1. Emotion-processing - Face task

Evidence in the literature points to an emotion-processing deficit in psychopathic individuals (e.g. Brook et al., 2013; Marsh & Blair, 2008). The previous findings in study 5 were in line with this claim, showing that individuals who scored high on the YPI were less sensitive to fearful and sad facial expressions compared to individuals with low psychopathic traits (i.e. low scores on the YPI). Individuals with higher psychopathic traits needed stronger signals of fear and sadness in the facial expressions in order to recognise them. As Blair (2005) suggests that the sight of these emotions motivates people to stop behaviours that evoke these expressions in others, then if a person who does not recognise these expressions until

more extreme they will be less inhibited from behaving in ways that produce these negative emotions in others. Additionally, in study 5 attachment was measured to investigate if the bond between individuals and their parents and attachment styles (i.e. anxious and avoidant) affected the link between psychopathic traits and emotion-processing. However, no such link was found.

In the current study, participants were not pre-screened and grouped into high and low psychopathy groups. Instead the relationship between emotion-processing and psychopathy was measured dimensionally. The findings of this study showed a very different pattern of results compared to study 5. The YPI higher-order factors *Interpersonal*, *CU* and *Lifestyle* were unrelated to sensitivity to emotions. Whether individuals had higher or lower levels of psychopathic traits did not change the way they perceived sad, fearful, angry and happy facial expressions. The Integrated Emotions system (IES) proposed that individuals with higher psychopathic traits do not find distress cues such as sad or fearful facial expressions as aversive as low psychopathic individuals. However, this theory could not be supported in this non-forensic sample. Neither could this study show a general emotion-processing deficit or lack of attention.

Furthermore, the FFM traits A, C and N which have been found to be related to the YPI higher-order factors (see Chapter 4) were also not found to be related to sensitivity to emotional faces. Sensitivity to emotional facial expressions showed a link only with the FFM trait O. When individuals were exposed to facial expressions ranging from happy to fearful, those individuals with higher levels of O saw more of these expressions as happy than individuals with lower levels of O. In other words individuals with higher levels of O were more sensitive to happy cues in the faces and did not identify faces as expressing fear until

the expression was more intense. There is some evidence that suggests that O is important for the recognition of emotional expressions (Matsumoto & LeRoux, 2000). However, if that was the case then O should be related to all emotion conditions, or if O was more specifically linked to recognising happy emotions than O should have been related to the happy expressions in the happy-sad condition as well. This was not the case.

Of course, this is not conclusive of whether or not individuals with higher psychopathic traits use the same or different strategies to identify the emotional facial expressions. For instance, Gordon, Baird and End (2004) measured psychopathic traits in the normal population and tested recognition of facial affect. Although behaviourally they found no differences between high and low scoring participants they found differences in amygdala activation and sub-regions of the frontal cortex when viewing emotional facial expressions.

However, it is possible that emotion-processing deficits in the normal population with psychopathic traits measured on a dimensional scale are too weak to be detected. This could explain why study 5 showed an effect of psychopathic traits on sensitivity to fearful and sad facial expressions whereas this study did not. The task in both studies was identical, however in the previous study participants were pre-selected for high and low psychopathic traits.

Therefore only those who scored very high and those who scored very low on the YPI were compared. Perhaps participants in the current study did not score as highly overall on the YPI as did participants in study 5. In study 5 participants' YPI total scores were measured and the 25th and 75th percentile calculated, for males and females separately. In this study, if the same procedure is used, females in the 25th and 75th percentile have the same total score as females in study 5. Males in the current study scored somewhat lower (25th = 95, 75th = 117) than males in study 5 (25th = 99, 75th = 120). However, examining both samples (preselection),

the overall mean and variance are similar across study 5 ($M=100.27$, Variance= 301.02) and study 6 ($M= 100.48$, Variance= 331.86). This shows that the difference in findings is unlikely to be due to differences in psychopathic traits across the two samples. However, participants in this study did not wear eye-tracking equipment and did not have to use a chin rest; participants were also not tested individually in a laboratory but were tested alongside at least three others in a computer room. This could have affected the performance on the tasks used.

6.5.1.1. Attachment styles and sensitivity to emotional stimuli

In addition to psychopathic traits, we also measured attachment to examine if attachment styles were related to differences in emotion-processing. Individuals who scored higher on avoidant attachment, i.e. individuals who tend to avoid emotional content, were more sensitive to fearful faces than happy faces compared to individuals who scored lower on avoidant attachment. Similarly, individuals who scored higher on the dismissing-avoidant attachment style continued to perceive facial expressions on the fearful-angry condition as fearful despite increasingly angry facial cues. These individuals needed angry faces to have a stronger intensity in order to recognise this expression compared to individuals who scored lower on dismissing-avoidant attachment. These findings are not consistent to the literature because insecure attachment was not related to either a general emotion-processing deficit (Dadds et al., 2008, 2011) or a specific deficit for angry or sad facial expressions (Niedenthal et al., 2002; Suslow, Dannlowski, Arolt, & Ohrmann, 2010, respectively). Overall the current findings may suggest that individuals with higher levels of avoidant attachment generally are more sensitive to fearful cues in facial expressions. However, in that case we would have expected avoidant attachment to be related to both fearful conditions (happy-fearful and

angry-fearful). Perhaps the association between avoidant attachment and emotion sensitivity in the happy-fearful condition was driven by the fearful-avoidant individuals and the effect disappeared in the angry-fearful condition. It is unclear however why this would be the case. It could be argued that dismissing-avoidant individuals have lower sensitivity to angry facial expressions but then it is unclear why these individuals did not show lower sensitivity to angry faces in the angry-sad condition. However, this is the advantage of this experimental design as it allowed us to identify that the observed correlations of sensitivity to emotions were not stable and therefore need to be interpreted with caution.

6.5.1.2. Categorisation of facial expressions

In addition to sensitivity to emotional facial expressions it was also examined how certain and consistent individuals were in responding to the facial stimuli along the different emotion continuums. The results suggest that for the angry-sad condition individuals with higher levels of C were more certain and consistent about categorising the emotions. The link between high levels of C and a clearer perceived difference between angry and sad faces may be due to those individuals being diligent and therefore paying good attention to the task and stimuli. This is in line with evidence showing a relationship between high levels of C and better attention and executive functioning (Fransson et al., 2013).

Within the same condition it was also found that individuals with dismissing-avoidant attachment responded more inconsistently to the facial stimuli along the angry-sad continuum. This would suggest that they were less certain where one emotion shifted into the other. Consistent with our hypothesis this supports the research showing that dismissing-avoidant individuals do not process emotions effectively (Niedenthal et al., 2002).

This may be due to them avoiding paying attention to the stimuli, although this claim cannot be substantiated from the current study and would need further research.

We also examined which of these factors; C and the dismissing-avoidant attachment style; was more or less predictive of responding consistently to the stimuli. The dismissing-avoidant attachment style remained predictors of consistent responding whereas C no longer predicted certainty on the task.

In summary, it seems that although there are some associations between sensitivity to specific emotions and certainty in identifying emotional facial expressions, these associations are only weak. Moreover, to argue that these factors are related to specific emotion-processing deficits would be an overstatement. The evidence found in this study is not substantial enough to make such a claim. As mentioned above, perhaps emotion-processing deficits are less detectable in the normal population with psychopathic traits measured on a dimensional scale.

6.5.2. Antisocial behaviour - Joy of destruction (JoD)

Psychopathic traits are associated with antisocial behaviour and within this thesis this link, i.e. with alcohol use and aggression, has been demonstrated psychometrically within the normal population. The current study aimed to identify if the link between antisocial tendencies and psychopathic traits in the normal population was also apparent on behavioural level. Therefore participants carried out the JoD game; a one-shot economic game in which one can choose to reduce another player's money for a small fee. There are no benefits of reducing the other player's money other than perhaps knowing that one has slightly more money than the other person.

It was expected that the *CU* higher-order factor of the YPI and lower-order facets of the *Interpersonal* factor (i.e. manipulation, grandiose sense of self) would be associated with reducing money on the JoD game. However, none of the YPI higher-order factors were associated with money burning.

It was also expected that low A and low C, which are related to psychopathy, would also be related to money burning. However, none of the FFM traits were found to be related to decision making on the JoD game. Attachment was also unrelated to money burning.

In summary, none of the independent variables measured in this study were related to money burning. There are a number of possible reasons for the lack of findings, the sample, the task and other factors that were not accounted for.

Power in this study was low, and the sample tested in this study was not a forensic sample. Although we do not know if any of the participants had ever been involved with the criminal justice system, at the time of testing they were living in the community. Those in the sample who had high psychopathic traits may have developed an adaptive way of living that keeps them from committing crimes. They may have a good sense of how individuals cooperate and use social norms. Therefore they may know how and when to use and manipulate others. Knowing that they were involved in a psychology experiment they may not have wanted to “look bad”. On the other hand, if the same game would be conducted in a forensic setting we may find very different results. It would therefore be a next step to involve prisoners in this game to examine if all offenders irrespective of psychopathic traits would burn money more than non-offenders or whether psychopathic traits increase the likelihood of burning money. It would also be interesting to investigate differences in

decision-making in conditions where offenders' choices are open for others to see as opposed to when their choices are hidden.

Secondly, it is possible that no effect of money burning was found here because the task was not realistic enough. In this case people who burned money perhaps just did so at random. However, participants were made aware at the beginning of the task that their choices would have real-life consequences for the other player, meaning that the other player would walk away with less money. Also, in order to walk away from the experiment with the highest amount of money, one had to *not* burn money. Therefore, it is unlikely that participants decided to burn money at random.

Instead, it is more likely that there were other factors that caused 18% of participants to burn money despite losing some of their own earnings. Abbink and colleagues argued that the JoD game measured 'nastiness' (Abbink & Herrmann, 2011; Abbink & Sadrieh, 2009). However, in the absence of a relationship with psychopathic traits, normal personality traits and attachment as indicators of prosocial and antisocial tendencies it is unclear what other factors could play a role, such as dominance or competitiveness.

6.5.3. Reactive and proactive aggression

In Study 3, we assessed psychometrically how psychopathic and normal personality traits in a student sample were related to reactive and proactive aggression. The current study aimed to replicate these findings to see if they were stable. Overall the findings in both studies were similar in some respects but not others. In both studies individuals who scored higher on the *Interpersonal* and *Lifestyle* factors of the YPI were more reactively aggressive than individuals who scored lower on these factors. The *Interpersonal* factor was a particularly strong predictor of reactive aggression. This finding was consistent across experiments. Also

consistent with Study 3, individuals with high levels of N and low levels of A were more reactively aggressive than individuals who had lower levels of these traits. However, whereas in the current study, A was the stronger predictor of reactive aggression, in study 3 both N and A predicted reactive aggressive behaviour. Moreover, when both psychopathic and FFM traits were entered into a model together to examine if the FFM traits were more effective than the psychopathic traits in predicting reactive aggression, only N remained a significant predictor. However, in the current study N was not found to be related to this type of aggression.

It was also investigated if the FFM traits could predict reactive aggression as effectively or more effectively than the YPI. The results showed low A remained a significant predictor of reactive aggression beside the Interpersonal factor.

These findings indicate a relatively stable relationship between reactive aggression and psychopathic traits that exists across samples with different sample sizes. Additionally, these findings suggest that this relationship is more stable than the link between reactive aggression and normal personality traits.

The relationship of proactive aggression and normal as well as psychopathic personality traits were also investigated. Individuals high on the *Lifestyle* factor of the YPI were more likely to be proactively aggressive compared to individuals who scored lower on this factor. Additionally, those with high levels of E and low levels of A and C were also more likely to be proactively aggressive. Once again it was examined if the FFM traits could predict proactive aggression as effectively as the YPI traits. In fact it was found that the FFM traits were more effective in predicting proactive aggression. The Lifestyle factor of the YPI was no longer a significant predictor, however, high E and low A remained significant. In study 3 on the other

hand Lifestyle was not related to proactive aggression but the Interpersonal factor of the YPI. Additionally, of the FFM traits only low A was associated with proactive aggression.

Compared to reactive aggression, it seems that for proactive aggression the most stable factor found in this thesis was low A.

6.5.4. Alcohol

In study 3, we also examined how normal and psychopathic personality traits were associated with alcohol use. There it was found that the *Interpersonal* and *Lifestyle* factors of the YPI were related to increased alcohol use. The findings in the current study are consistent with this, showing that individuals with higher *Interpersonal* and *Lifestyle* traits showed more severe alcohol use behaviour. The link was stronger for individuals high on the *Lifestyle* factor.

In Study 3 it was also found that increased alcohol use was associated with higher levels of N, E and lower levels of C. Similarly, it was found here that alcohol use was related to high E and N, but not C.

Lastly, it was examined if the FFM traits could predict alcohol use as effectively, or more effectively than the YPI factors. Whereas in study 3 the Lifestyle factor and N were the strongest predictors, the results here indicate instead that the FFM traits were better predictors of alcohol use behaviour than psychopathic traits. The YPI factors related to alcohol use were no longer significant predictors of alcohol use once FFM traits were accounted for.

In summary, for alcohol use the relationship with psychopathic traits and the FFM personality traits are relatively stable, showing that the Lifestyle factor has an important role

to play in whether or not individuals engage in more or less alcohol use behaviour. Equally, individuals with higher levels of N are also at risk of drinking more alcohol than individuals with lower levels of N. Research into psychopathic traits shows a link between the Lifestyle factor and N (e.g. Miller & Lynam, 2003) and although this link is not consistently found as demonstrated in this thesis (see Chapter 3), it may be that it is high N that drives the link between psychopathic traits and alcohol misuse.

6.5.5. Limitations

One obvious limitation of this study was the attachment measure. The rationale of this study in terms of attachment was to investigate specifically the impact of the dismissing-avoidant attachment style on psychopathic traits and related antisocial outcomes. There is some indication that this attachment style is linked to antisocial behaviour (Lyons-Ruth, 1996) and is related to emotion-processing difficulties (Niedenthal et al., 2002). However, there does not seem to be reliable self-report measures of attachment styles at present. Although the RSQ, which was used in this study, has been used even recently to investigate attachment styles (e.g. Silva et al., 2015), the internal reliability was less than adequate for three out of four attachment style scales. Additionally, Kurdek who examined different factor structures of the RSQ found that only a two-factor solution showed adequate fit, i.e. anxious and avoidant attachment (Kurdek, 2002). However, when the internal reliability of the four-factor structure (i.e. secure, preoccupied, fearful-avoidant and dismissing-avoidant) was examined, the dismissing-avoidant attachment style showed acceptable internal reliability. Therefore it was possible to use this attachment style in the analysis.

There are perhaps more effective ways of measuring attachment, for instance Interview-based assessments of attachment styles such as the Adult Attachment Interview (AAI: Main

et al., 2002). However, using these would have been very time-intensive because of necessary training to administer the interview as well as the actual carrying out of the interviews. This would have meant a smaller sample size and with that less power to detect and examine individual differences. Therefore it was not possible in the current study to measure attachment this way.

6.6. CONCLUSIONS

Although in Chapter 5 it was found that individuals in the high psychopathy group were less sensitive to fearful and sad facial expressions this could not be replicated when psychopathic traits were measured dimensionally. Behavioural measures of emotion-processing and antisocial behaviour that are linked with psychopathic traits could not be demonstrated in this student sample. Psychometrically, however, it was demonstrated that psychopathic traits were linked to alcohol use and aggression in a sample of non-forensic individuals. This suggests that although links between psychopathy and psychopathy-related outcomes can be evidenced psychometrically, such behaviour measures are too weak to detect associations in the normal population. Additionally, although attachment was found to be linked to psychopathic traits in Chapter 4, these self-report measures may not be sufficient to detect behavioural links with antisocial tendencies and psychopathy.

CHAPTER 7: GENERAL DISCUSSION

This chapter will first outline the overall findings for each study, then discuss the findings in relation to the research questions and the contributions these findings have for the literature. This will be followed by a discussion about future avenues for research.

7.1. SUMMARY OF FINDINGS

The main research questions of this thesis were:

- (i) What is the relationship between self-report measures of psychopathy and psychopathy-related emotional, cognitive and behavioural outcomes in the normal population?
- (ii) Do more standard personality measures based on the Five-Factor Model (FFM) of personality predict these psychopathy-related outcomes?
- (iii) What role does attachment play in the relationship between psychopathy and emotion-processing as well as antisocial and prosocial behaviour?

In Study 1 (Chapter 2) it was examined how FFM personality traits, measured by the NEO-Five Factor Inventory (NEO-FFI), were related to internalising and externalising disorders as well as alcohol and substance use in a large adolescent sample. Additionally it was investigated how a newly developed scale, the Primary and Secondary Psychopathic Traits (PSPT), was related to psychopathologies and alcohol and drug use.

Overall the findings in Study 1 indicated that the standard FFM personality traits predicted overall clinical diagnoses better than the PSPT scale. N, A and C were predictive of diagnoses and these personality factors have been strongly associated with psychopathy (Lynam &

Derefinko, 2006; Miller et al., 2003). However, the PSPT scales seemed to better predict internalising and externalising disorders. Both the FFM and PSPT factors did not predict alcohol and drug use well. This suggested that the PSPT may be as good as the standard FFM traits at predicting psychopathy-related outcomes. However, the PSPT may be better suited for examining relationships with specific mental health-related outcomes than the standard FFM traits.

In Study 2 (Chapter 3) it was examined how normal and psychopathic personality traits were associated with alcohol use and aggression and whether the FFM traits and PSPT factors could predict these outcomes more effectively than a validated psychopathy measure, the YPI, in an adolescent sample. Proactive and reactive aggression were found to be related to low C, low A, low E and differed on N whereby reactive aggression was associated with high N and proactive aggression with normal levels of N. In comparison, the PSPT scales were not able to make a distinction between proactive and reactive aggression because the PSPT primary traits were found to be unrelated to both types of aggression and only the PSPT secondary factor showed a relationship with the proactive and reactive aggressive behaviour. These findings suggest that the PSPT scales are not as sensitive as the standard FFM personality traits in distinguishing aggressive psychopathy-related behaviour.

Additionally, it was examined how strongly the psychopathy measure YPI, the FFM traits and the PSPT were associated with aggressive behaviour. It was found that the YPI was most effective in predicting aggression, followed by the FFM traits, with the PSPT scales showing the weakest associations. On the other hand, alcohol use was only predicted by how agreeable adolescents were. Less agreeable individuals were more likely to have consumed alcohol by age 14. Psychopathic traits as measured by the YPI or indexed by the PSPT were

unrelated to alcohol use. This suggests that personality traits based on the FFM are effective in explaining psychopathy-related outcomes such as aggression and alcohol use, more so than the PSPT scales. However, especially aggression was best predicted by the psychopathy measure. As the PSPT scales were not found to be more effective than the standard FFM personality traits, the PSPT scales were no longer included in subsequent studies.

Study 3 was a replication of Study 2 and used a sample of young adults. Overall the findings suggest that across the adolescent and adult sample low A played an important role in reactive aggression. Also for adults, high N was a good predictor of reactive aggression, even more so than psychopathic traits. However, the factors related to proactive aggression differed between adolescents and adults. Whereas in adolescents *callous/unemotional* traits as measured by the YPI were important predictors of proactive aggression, in adulthood it was *interpersonal* traits. Research that investigates psychopathic traits in children and young adolescents typically use measures of *callous/unemotional* traits as an indicator of psychopathic characteristics (Kimonis et al., 2014; Viding et al., 2005). These traits have been found to strongly predict the development of adult psychopathy. This may explain why *callous/unemotional* traits were so strongly associated with proactive aggression in the sample of adolescents. Arguably, as the individual matures, traits related to manipulation and exploitation will likely develop too and become useful for proactive aggression in adulthood. This may explain the impact of the *Interpersonal* factor of psychopathy in relation to proactive aggression in the young adult sample. In the adult sample *Lifestyle*, as measured by the YPI, was the best predictor of alcohol use.

Taken together the findings from Study 2 and 3 show that psychopathy measures seem to be more effective in predicting alcohol use and aggression than FFM traits. However, FFM traits

related to psychopathy, i.e. A and C, add to measures specifically developed to assess psychopathic traits.

This thesis then went on to examine whether normal and psychopathic personality traits were related to attachment to determine if attachment could be investigated in subsequent studies to examine its involvement in emotion-processing deficits (Study 4). The findings of Study 4 suggest a link between attachment, FFM traits as well as psychopathic traits in a non-forensic setting. Individuals with higher psychopathy scores had lower attachment security to mothers and fathers.

Although low E, low A and low C were also related to less secure attachment, mother attachment remained a significant predictor of the *Interpersonal*, *CU* and *Lifestyle* factors when the FFM personality traits were accounted for. The relationship between father attachment and psychopathy was moderated by N, such that for individuals with higher levels of N, insecure attachment to fathers increased secondary psychopathic traits (*Lifestyle*). Similarly, individuals with a secure attachment styles were found to have lower psychopathic traits, and specifically lower *CU* traits. Individuals with higher psychopathic traits tended to score higher on the dismissing-avoidant attachment style. This attachment style is related to avoiding intimacy, independence, self-reliance and emotions regulation difficulties (Bartholomew & Horowitz, 1991).

Study 5 (Chapter 5) investigated whether university students with high and low psychopathic traits showed behavioural and attentional differences in processing of emotional facial expressions. The extent to which attachment influenced this relationship was investigated. Secondly, it was investigated if psychopathic traits in the normal population were related to giving behaviour (i.e. prosocial behaviour) and if attachment affected this relationship.

Behaviourally the high and low psychopathy groups differed, indicating lower sensitivity for fearful and sad facial expressions in the high psychopathy group. On the other hand, the high and low psychopathy groups did not differ in the way they paid attention to the eye region of the facial stimuli. This may suggest that the emotion-processing deficits found in individuals with high psychopathic traits may be due to higher-order cognitive processes.

The two groups did not differ in the amount they donated to the charity. Both the high and low psychopathy group behaved as prosocial as each other. This relationship was also not affected by attachment to parents or by empathic concern.

Finally, Study 6 (Chapter 6) aimed to replicate the emotion-processing task of Study 5 where psychopathic traits were measured dimensionally. It was also tested to what extent normal and psychopathic personality traits were related to antisocial tendencies measured behaviourally by the Joy-of-Destruction game. Attachment was also examined within this context. Lastly, Study 6 investigated once again the relationship between normal and psychopathic personality traits and alcohol use and aggression.

The findings of Study 6 indicated no emotion-processing deficits in individuals with higher psychopathic traits, no relationship to FFM personality traits nor a link to insecure attachment styles. Self-reported psychopathy and personality traits were also not linked to behavioural indices of antisocial tendencies. Similarly no relationship was found for attachment styles and antisocial behaviour.

Psychometrically it was found that individuals who scored higher on the *Interpersonal* and *Lifestyle* factors of the YPI were more reactively aggressive than individuals who scored lower on these factors. Both FFM traits and psychopathic traits were effective in predicting reactive aggression. These findings indicate a relatively stable relationship between reactive

aggression and psychopathic traits that exists across samples with different sample sizes and is stronger than for normal personality traits. On the other hand, the FFM traits were found to be more effective in predicting proactive aggression than psychopathic traits.

For alcohol use the findings indicated the YPI *Lifestyle* factor to play an important role in whether or not individuals engage in more or less alcohol use behaviour. This further supports the findings in Study 3. However, N also played a role in alcohol use behaviour in this study.

7.2. CONTRIBUTIONS TO THE LITERATURE

7.2.1. *The relationship between self-report measures of psychopathy and psychopathy-related outcomes*

In this thesis self-reported psychopathic traits were assessed to examine how well these traits predicted self-reports of aggression and alcohol-use behaviour in adolescents and young adults within a non-forensic population. Consistently across Study 2, 3 and 6 psychopathic traits (*Interpersonal*, *CU* and *Lifestyle*) predicted reactive and proactive aggression. This was apparent in both youth and young adults although the relationship changes with development. In adolescence, CU traits were most strongly related to proactive aggression. Interestingly, CU traits in youth have been found to be the most effective predictor of adult psychopathy (Viding et al., 2005) and proactive aggression, at least in forensic settings, has been found to be a feature uniquely associated with criminal psychopaths (Blais et al., 2014). This supports the notion that CU traits are an important indicator of psychopathic traits and shows that these traits, measured within main-stream schools, are related to psychopathy-related outcomes in predictable ways.

In adults, *Interpersonal* traits, i.e. being able to manipulate and lie, are most strongly related to aggression, both reactive and proactive. Impulsive characteristics (i.e. *Lifestyle* factor) are however also important for reactive aggression. This relationship exists because reactive aggression is an impulsive response to provocation (Blair, 2010). The *Lifestyle* factor is also relevant in predicting alcohol use in young adults. More impulsive, irresponsible individuals are more likely to engage in increased alcohol use behaviour. This relationship only seemed to develop in adulthood as it was not observable in 14-year olds.

In this thesis it was further examined if psychopathic traits in a non-forensic setting could not only predict self-reported antisocial outcomes but also whether psychopathic traits would be associated with behavioural indices of antisocial and prosocial tendencies. To that end it was examined in Study 5 if groups of individuals with high and low psychopathic traits differed in the amount of money they donated to a charity. This was the first time that the relationship between psychopathic traits and behaviour on the Charity Dictator Game (CDG) was investigated. It was expected that individuals in the high psychopathy group would be less inclined to donate money due to lower levels of empathy and/or less secure attachment. However, individuals with high psychopathic traits donated similar amounts of money as did individuals in the low psychopathy group. Furthermore, in Study 6 it was tested whether a relationship could be found between psychopathic traits and antisocial behaviour on the Joy-of-Destruction (JoD) game in which participants could burn their partner's money. This task is still very new and has never been used in association with psychopathy before. In this behavioural paradigm no associations were found for higher psychopathic traits and antisocial tendencies, despite the fact that 18% of participants reduced their partner's money.

This means that although psychometrically psychopathic traits were related to antisocial tendencies, these tendencies, as well as the lack of prosocial tendencies, could not be found behaviourally in the samples used here. There could be a number of reasons for this. Perhaps one reason is that the samples tested were a non-forensic sample. The individuals with higher psychopathic traits may have adapted to the social conventions in a way that keeps them away from coming into contact with the criminal justice system. These individuals may know that giving money to a charity is seen as a positive act. Giving behaviour is seen as a desirable characteristic that brings with it social benefits. A review on charitable giving found that giving behaviour increased positive regard from others, and that not giving lowered people's reputation (see Bekkers & Wiepking, 2011). Therefore individuals with psychopathic traits may show prosocial behaviour that is motivated by reasons of reputation. Similarly, such individuals may understand that antisocial behaviour, such as reducing other people's money, will not be seen as a favourable act. Since participants in the JoD game were aware that they were part of an experiment, they may have tried to conform to what is socially acceptable.

In this thesis it was investigated for the first time how psychopathic traits in a non-forensic setting were related to performance on a facial expression identification task that recorded eye movements and tried to link emotion-processing to both attachment and prosocial and antisocial behaviour. These studies showed that within a non-forensic sample emotion-processing difficulties could be identified. However, this lower sensitivity for fearful and sad facial expression was only detectable between groups with high and low levels of psychopathic traits. Emotion-processing difficulties were not found when psychopathic traits were measured dimensionally. Furthermore, within the non-forensic samples used,

emotion-processing was not related to attachment or prosocial and antisocial tendencies as measured by the CDG and JoD game.

Overall these findings have implications for future research. Studies aiming to examine psychopathic traits in non-forensic and non-clinical settings will have to carefully plan their investigation of psychopathy in relation to psychopathy-related outcomes. It is certainly possible to link psychopathy to theoretically associated behaviours or underlying deficits such as antisocial behaviours or emotion-processing difficulties. However, this should be meaningfully tested by either using psychometric assessments of behaviours or by using groups of individuals who are on the extreme ends of the psychopathy continuum.

7.2.2. Standard personality measures based on the Five-Factor Model (FFM) of personality and psychopathy-related outcomes

In this thesis it was investigated to what extent FFM personality traits were related to psychopathy and psychopathy-related outcomes. Additionally, a newly developed scale based on the NEO-FFI personality measure, the Primary and Secondary Psychopathic Traits (PSPT) scale, was examined to assess its predictability of psychopathy-related outcomes. This was examined in 14-year old adolescents who were part of a large European study, the IMAGEN project. Study 1 was the first study that examined the relationship between the PSPT and psychopathy-related outcomes in a large international longitudinal study.

Additionally, this thesis tested if a reconfiguration of the NEO-FFI items would improve the assessment of psychopathy and related outcomes. In the past this was done by Witt and colleagues using items from the longer NEO-PI-R version (Witt, Brent Donnellan, et al., 2009). This thesis found that the PSPT predicted mental health problems, aggression and alcohol use but that it was not as effective as the NEO-FFI and YPI in predicting these

outcomes. Perhaps the items within the PSPT are not sufficient to effectively capture psychopathic traits whereas the NEO-FFI contains a wider range of items. These items may, as configuration of traits, be more comprehensive for measuring psychopathic traits than the PSPT.

Overall, the findings suggest that the FFM traits as measured by the NEO-FFI that are related to psychopathy, as well as the PSPT scales showed similar patterns of associations with aggression, alcohol and drug use and mental health problems as found in the literature (e.g. Miller et al., 2008; Skeem et al., 2007) and the findings here extend these associations to adolescents in the community. However, normal personality traits were not meaningfully related to emotion-processing on the Face task nor were they related to the JoD game.

With regard to the Youth Psychopathy Inventory (YPI) that was used consistently within this thesis, normal personality traits seemed to contribute to some extent, adding predictive value to the YPI for alcohol use behaviour. For proactive and reactive aggression normal personality traits seemed to be even more effective than the YPI. It could be argued that this is due to the fact that the YPI does not measure the forth factor of psychopathy, i.e. antisocial behaviour. However, Cooke and Michie proposed the three-factor structure of psychopathy (see Chapter 1, section 1.2), stating that the antisocial factor was a consequence of psychopathic traits rather than an inherent characteristic in itself (Cooke et al., 2007). This would suggest that measuring the *Interpersonal*, *CU* and *Lifestyle* factor would enable us to predict antisocial tendencies such as aggression. Since antisocial behaviour is one of the main problems related to psychopathy it seems important that psychopathy measures can in fact predict these behaviours. The findings here show that

FFM personality traits may be a useful addition to psychopathy measures in assessing people's psychopathic traits as they add to the prediction of relevant behaviours.

7.2.3. The role of attachment in the relationship between psychopathy and emotion-processing, antisocial and prosocial behaviour

In the literature there is evidence for a relationship between psychopathy and attachment (e.g. Dadds et al., 2012; Kochanska & Kim, 2013; Kosson, Cyterski, et al., 2002; Mack et al., 2011), although some research has not found this link (Brennan & Shaver, 1998; Frodi et al., 2001). This thesis has lent support for the former, showing that self-reported attachment was related to psychopathy. This link was found in terms of attachment security to mothers and father as well as in terms of the attachment style associated with antisocial tendencies, the dismissing-avoidant attachment style.

However, similar to the findings in the previous two sections, no link was found between attachment and behavioural measures of emotion-processing, prosocial and antisocial tendencies. Evidence in the literature suggests that secure attachment is related to more prosocial behaviour (Kochanska & Kim, 2013) and less antisocial behaviour (Dadds et al., 2012; Gao et al., 2010). Perhaps one of the reasons why no relationship was found between attachment and behavioural outcomes had to do with the attachment measures themselves. This will be further discussed in the next section.

Nonetheless, these findings do not necessarily mean that attachment has no impact on behaviour in psychopathic individuals. It is possible that attachment has a greater impact on psychopathic individuals within forensic settings either because of the severity of insecure attachment or perhaps because the consequences of insecure attachment manifest themselves in more maladaptive, antisocial ways.

7.3. FUTURE DIRECTION FOR RESEARCH

7.3.1. *Measuring attachment*

Attachment in this thesis was assessed using self-report measures. The internal consistency for the measure assessing mother and father attachment was good, but the measure investigating particular attachment styles had, apart from the dismissing-avoidant style, very low internal consistency. It is a challenging task to develop items to measure attachment styles. The items used in these questionnaires can be interpreted differently by participants and seem context-dependent. For example “I worry about being alone” could be interpreted as whether or not someone is temporarily comfortable not having a partner or as being alone for a long time. The interpretation of the question will impact participants’ answers and without being able to question their answers it is difficult to know whether they interpreted the questions in the way they were intended. Therefore future studies would benefit from using semi-structured interviews instead of self-report attachment measures. Ambiguous questions can be made clearer and more information from the interviewee can be obtained when necessary. This will allow for a more detailed and clear assessment of people’s attachment.

Furthermore, it was investigated in this thesis what impact attachment had on the link between psychopathy and emotion-processing as well as prosocial and antisocial behaviour. Although attachment was not found to have an impact on these emotion-processing and psychopathy-related behaviours, the link should be investigated in forensic populations. If attachment has an impact on emotion-processing it can be explored whether this impact is due to severity of insecure attachment or because of maladaptive ways of coping. This

would help to explain differences between forensic and non-forensic populations in terms of the effect of attachment.

7.3.2. Facial expression identification

The Face Task employed in Study 5 and 6 was a two-forced-choice paradigm using morphed images that changed between four expressions. The behavioural responses were indicative of sensitivity to the facial expressions and showed that individuals with high psychopathic traits were less sensitive to fearful and sad expressions compared to low psychopathic individuals. However, it has been argued that forced-choice paradigms have the problem of being insensitive to certain biases (Snowden et al., 2013). For instance, if a person is particularly sensitive to angry faces this person will identify angry expressions very well but may also wrongly identify other expressions as angry. Therefore, the measure may assess an emotion bias rather than how accurately the person can identify expressions overall. There are paradigms that avoid these problems and could potentially be used in future studies in combination with the Face Task that was used in this thesis.

For instance, Snowden and colleagues showed participants four images with facial expressions, three of them were neutral and one showed the emotion (Snowden et al., 2013). Participants had to decide which of the four faces displayed the emotion. The benefit of this set-up is that it eliminates the problem of bias towards particular facial expressions and instead measures overall accuracy of emotion identification.

Future studies should also further explore the impact of FFM personality traits in relation to psychopathy. In Study 5 emotion-processing was investigated in groups with high and low psychopathic traits. It would be interesting to examine if using groups with very high and very low levels of A and C would demonstrate similar results as found in Study 5. This would

show whether these normal personality traits at the fringes of the continuum match the profiles found in clinical and forensic populations and would potentially further strengthen the claim that personality disorders are extreme variants of normal personality (Widiger & Mullins-Sweatt, 2009).

7.3.3. Behavioural economic games

The JoD game is a novel task that may help to provide a behavioural measure of antisocial tendencies and can perhaps be used to distinguish psychopathic from non-psychopathic individuals. Although the task did not show any significant results in Study 6, it is possible that differences on the task will be observable when comparing individuals with high and low psychopathy scores. These differences may be even more marked within forensic populations. It should therefore be tested in forensic settings which traits are associated with reducing money of the other player and specifically whether these traits are uniquely associated with psychopathy.

Additionally, in order to further validate the JoD, future studies using this task could add measures of social desirability (self-deception and impression management). These measures were not included in Study 6 because participants already had a substantial amount of questionnaires to fill in and we did not want to overload them. Additionally, some evidence suggests that self-deception and impression management are traits in themselves that do not affect the relationship between personality traits and performance (Li & Bagger, 2006).

7.4. CONCLUSION

This thesis has demonstrated that not only were measures of psychopathy related to psychopathic outcomes such as aggression and emotion-processing deficits in the normal population but that normal personality traits based on the FFM of personality can inform research about psychopathy-like traits and psychopathy-related outcomes. Personality traits should in fact be integrated with measures of psychopathy as this thesis has shown that for outcomes such as aggression, which are related to psychopathy, are predicted more effectively by FFM personality traits compared to the psychopathy measure, (YPI) used.

This thesis has also shown that investigating the link between psychopathic traits and antisocial and prosocial tendencies behaviourally in the normal population was limited to extreme groups (i.e. very high and very low scores on a psychopathy measure). This should be considered in future studies aiming to investigate this link.

Although attachment may be a relevant mechanism in psychopathy, this link could not be identified here. It seems that self-report measures of attachment are not ideal in predicting psychopathy-related outcomes in the normal population. Instead, future research should focus on using interview-based attachment measures in order to better separate different attachment styles. This will allow a better investigation of the impact these styles have on psychopathy.

8. REFERENCES

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9. APPENDICES

APPENDIX 2.1. EUROPEAN SCHOOLS PROJECT ON ALCOHOL AND OTHER DRUGS (ESPAD)

At the start of the questionnaire the respondent is given the following instructions:

“This survey asks you questions about yourself and about your activities, and reasons for engaging in those activities.

This is an anonymous questionnaire – it does not include your name or any other information, which would identify you individually.

Read each question carefully.

Read every answer to each question before deciding which is the best one for you.

This is not a test, there are no right or wrong answers and there are no trick questions.

If you do not find an answer that fits exactly, choose the one that comes closest.

Thank you in advance for your participation.”

15. On how many occasions IN YOUR WHOLE LIFETIME have you had any alcoholic beverage to drink?

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19
- f. 20-39
- g. 40 or more

16. On how many occasions OVER THE LAST 12 MONTHS have you had any alcoholic beverage to drink?

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19
- f. 20-39
- g. 40 or more

17. On how many occasions OVER THE LAST 30 DAYS have you had any alcoholic beverage to drink?

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19
- f. 20-39
- g. 40 or more

18. On how many occasions OVER THE LAST 30 DAYS have you had beer to drink? (Do not include low alcohol beer)

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19
- f. 20-39
- g. 40 or more

19. When did you FIRST drink beer (at least one glass)?
- Never
 - 11 years old or less
 - 12 years old
 - 13 years old
 - 14 years old
 - 15 years old
 - 16 years old
20. On how many occasions OVER THE LAST 30 DAYS have you had wine to drink?
- 0
 - 1-2
 - 3-5
 - 6-9
 - 10-19
 - 20-39
 - 40 or more
21. When did you FIRST drink wine (at least one glass)?
- Never
 - 11 years old or less
 - 12 years old
 - 13 years old
 - 14 years old
 - 15 years old
 - 16 years old
22. On how many occasions OVER THE LAST 30 DAYS have you had an alcopop to drink? (e.g. Barcardi Breezer)
- 0
 - 1-2
 - 3-5
 - 6-9
 - 10-19
 - 20-39
 - 40 or more
23. When did you FIRST drink alcopops (at least one bottle)?
- Never
 - 11 years old or less
 - 12 years old
 - 13 years old
 - 14 years old
 - 15 years old
 - 16 years old
24. On how many occasions OVER THE LAST 30 DAYS have you had spirits to drink? (whisky, cognac, shot drinks etc) (also include spirits mixed with soft drinks, except alcopops)
- 0
 - 1-2
 - 3-5
 - 6-9
 - 10-19
 - 20-39
 - 40 or more
25. When did you FIRST drink alcopops (at least one glass)?
- Never
 - 11 years old or less
 - 12 years old
 - 13 years old
 - 14 years old
 - 15 years old
 - 16 years old

For questions 26-29 there is a constant display in the corner of the screen informing the participants that:

"One drink is: 1 glass of wine; 1 can or bottle of beer; 1 shot of spirits; 1 alco-pop (eg Breezer)"

- 26. How many times IN YOUR WHOLE LIFETIME have you had five or more drinks in a row?**
- a. 0
 - b. 1
 - c. 2
 - d. 3-5
 - e. 6-9
 - f. 10 or more times
- 27. How many times OVER THE LAST 12 MONTHS have you had five or more drinks in a row?**
- a. 0
 - b. 1
 - c. 2
 - d. 3-5
 - e. 6-9
 - f. 10 or more times
- 28. How many times OVER THE LAST 30 DAYS have you had five or more drinks in a row?**
- a. 0
 - b. 1
 - c. 2
 - d. 3-5
 - e. 6-9
 - f. 10 or more times
- 29. How many drinks containing alcohol do you have on a TYPICAL DAY when you are drinking?**
- a. 1 or 2
 - b. 3 or 4
 - c. 5 or 6
 - d. 7 to 9
 - e. 10 or more

For questions 30-40 the participant is asked

"How likely is it that each of the following things would happen to you personally, if you drink alcohol?"

The response options are:

- a. Very likely
- b. Likely
- c. Unsure
- d. Unlikely
- e. Very unlikely

The outcomes to which the participants respond are:

- 30. Feel relaxed
- 31. Get into trouble with police
- 32. Harm my health
- 33. Feel happy
- 34. Forget my problems
- 35. Not be able to stop drinking
- 36. Get a hangover
- 37. Feel more friendly and outgoing
- 38. Do something I would regret
- 39. Have a lot of fun
- 40. Feel sick

- 41. On how many occasions IN YOUR WHOLE LIFETIME have you been drunk from drinking alcoholic beverages?**
- a. 0
 - b. 1-2
 - c. 3-5
 - d. 6-9
 - e. 10-19
 - f. 20-39
 - g. 40 or more
- 42. On how many occasions OVER THE LAST 12 MONTHS have you been drunk from drinking alcoholic beverages?**
- a. 0
 - b. 1-2
 - c. 3-5
 - d. 6-9

- e. 10-19
- f. 20-39
- g. 40 or more

43. On how many occasions OVER THE LAST 30 DAYS have you been drunk from drinking alcoholic beverages?

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19
- f. 20-39
- g. 40 or more

44. When did you FIRST get drunk from drinking alcoholic beverages?

- a. 11 years old or less
- b. 12 years old
- c. 13 years old
- d. 14 years old
- e. 15 years old
- f. 16 years old

45. Please indicate on this scale from 1 to 10 how drunk you would say you were the last time you were drunk.

1	2	3	4	5	6	7	8	9	10
Somewhat merry only									Heavily intoxicated to the point of being unable to stand on my feet.

For the next question participants are again reminded that:

"One drink is: 1 glass of wine; 1 can or bottle of beer; 1 shot of spirits; 1 alco-pop (eg Breezer)"

46. How many drinks do you usually need to get drunk?

- a. 1-2 drinks
- b. 3-4 drinks
- c. 5-6 drinks
- d. 7-8 drinks
- e. 9-10 drinks
- f. 11-12 drinks
- g. 13 drinks or more

The next set of questions ask the adolescent: *"Have you ever heard of any of the following drugs?"*

They can then indicate either 'Yes' or 'No'

The drugs that the adolescents are asked about are the same as those that the parents are asked about in questions 13-27.

62. Have you ever wanted to try any of the drugs mentioned in the previous questions?

- a. Yes
- b. No

For each substance the adolescents are then asked the following set of questions where the substance is inserted in place of the 'x':

1. On how many occasions IN YOUR WHOLE LIFETIME have you used x

- a. 0
- b. 1-2
- c. 3-5
- d. 6-9
- e. 10-19

- f. 20-39
- g. 40 or more
- 2. On how many occasions OVER THE LAST 12 MONTHS have you used x**
 - a. 0
 - b. 1-2
 - c. 3-5
 - d. 6-9
 - e. 10-19
 - f. 20-39
 - g. 40 or more
- 3. On how many occasions OVER THE LAST 30 DAYS have you used x**
 - a. 0
 - b. 1-2
 - c. 3-5
 - d. 6-9
 - e. 10-19
 - f. 20-39
 - g. 40 or more
- 4. On how many occasions OVER THE LAST WEEK have you used x**
 - a. 0
 - b. 1-2
 - c. 3-5
 - d. 6-9
 - e. 10-19
 - f. 20-39
 - g. 40 or more
- 5. When did you first try x?**
 - a. 11 years old or less
 - b. 12 years old
 - c. 13 years old
 - d. 14 years old
 - e. 15 years old
 - f. 16 years old

APPENDIX 2.2. DIAGNOSES NOT INCLUDED IN LCA

DELETED ITEMS

any disorder

Posttraumatic Stress Disorder

undifferentiated anxiety/depression

any social anxiety

Mutism

Attachment Disorder (disinhibition)

Attachment Disorder (inhibition)

Attach Disorder other

any ADHD

any Conduct/Oppositional Disorder

Conduct Disorder other

PDD/Autism

Tic Disorder

Eating Disorder

Psychosis

Stereotypic

Any other

APPENIX 3.1 INFORMATION SHEETS, CONSENT FORMS AND DEBRIEF

FORM FOR STUDY 2

Parent Information Sheet

Research Project: The role of personality in adolescents' risky behaviour

Researcher: Kathleen Baess (lpxeb1@nottingham.ac.uk)

Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Prof Eamonn Ferguson (eamonn.ferguson@nottingham.ac.uk)

Dear Parent/Carer,

We would like to invite your child to take part in a study about personality and behaviour conducted in the School of Psychology at the University of Nottingham. This study has been approved by the ethics committee of the School of Psychology. In order for your child to take part, we require parental consent.

What is the study about?

Every person is different in their personality and behaviour. The study aims to look at differences in certain personality aspects in adolescence (between the ages of 13-15) and how these may be related to risky behaviours. This is important as we would like to find out more about how early developing personality aspects influence behaviour during adolescence but also what it may tell us about the relationship between personality and behaviour in later life.

What does the study involve?

We would like to ask your child to complete a few questionnaires looking at different aspects of personality and how individuals react in certain situations. The questions are all simple and there are no trick questions or right or wrong answers. Completing the online questionnaires will take approximately 25 minutes. For taking part in this study your child will be entered into a prize-draw where s/he can win £50 at the end of the study.

How will the data be used?

The data you provide is completely anonymous, which means that it is collected and stored without any identifying information (such as names or date of births). The data will be kept confidential and will not be shared with others. However, you should be aware that since this research is conducted online, there is always a risk of intrusion by outside agents, for example through hacking, and therefore the possibility of being identified. However, we do everything to ensure that this does not happen by keeping your data in an encrypted format on a secure server and we ensure that the data and anything identifying your child is kept separately.

The data is used for research purposes only – thus, when we have collected data from many adolescents, we will analyse the combined data and write up the results in scientific papers. It is important to understand that your child is under no obligation to complete this study. It is voluntary and s/he can withdraw from the study at any point and without giving any reason.

What needs to be done?

We would like you to discuss this study with your child, and if both of you are willing to take part, we would ask you to complete an online consent form under the following web link:

<https://www.surveymonkey.com/s/UoNPersonalityStudyParent>

Once you have given your consent you will be given another link for the online survey so your child can access it. If you do not want to take part, you do not need to do anything.

We hope that you feel able to help us with this study. If you have any questions about this study please contact the researchers. They will be happy to answer any questions or concerns you may have.

Yours sincerely,

Kathleen Baess

Participant Information Sheet for Study 2

Research Project: The role of personality in adolescents' risky behaviour

Researcher: Kathleen Baess (lpxeb1@nottingham.ac.uk)
Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)
Prof Eamonn Ferguson (eamonn.ferguson@nottingham.ac.uk)



Dear Pupil,

We would like to invite you to take part in a study about personality and behaviour carried out in the School of Psychology at the University of Nottingham.

What is the study about?

Every person is different and the study's aim is to look at these differences in young people's personality, and how they relate to behaviours. This is important to us as we would like to find out more about how personality and behaviour, especially personality in adolescence, may tell us something about behaviour in later life.

What does the study involve?

There will be some short questionnaires to answer. Some will look at different aspects of personality and others will look at how individuals react in certain situations. The questions are all simple and there are no trick questions or right or wrong answers. Completing the online survey will take approximately 25 minutes.

For taking part in this study you will be entered into a prize-draw where you can win £50 at the end of the study.

How will the data be used?

All your information will be kept confidential and will be made anonymous – so your responses will not be able to be linked to you personally. The collected data will only be used for research purposes and we will not pass it on to anyone else.

If you have any questions about this study you can contact us using the e-mails provided above. We will be happy to answer any questions or concerns you may have.

What needs to be done?

If you and your parents/carers are willing for you to take part, your parent/carers will complete an online consent form, which will give you access to the link for the online survey.

We hope that you feel able to help us with this study. If at any time you decide that you do not want to continue to take part in the study, you are free to withdraw.

Yours sincerely,
Kathleen Baess

Parent Consent Form for Study 2

Research Project: The role of personality in adolescents' risky behaviour

To participate in this research, read this form. To consent to each aspect of the research, please tick the boxes below. If you wish to opt out of a particular aspect of the research please let us know.

- | | |
|---|--------------------------|
| 1. I have read and understood the information sheet on the above project and have been given a copy to keep. | <input type="checkbox"/> |
| 2. I have had the opportunity to ask questions about the project, these have been answered satisfactorily. | <input type="checkbox"/> |
| 3. I received enough information about the studies and understand why the research is being done. | <input type="checkbox"/> |
| 4. I understand that my child and/or I have the right to withdraw our participation at any time without giving a reason. | <input type="checkbox"/> |
| 5. I understand that the information that I and my child give are anonymous and confidential and will not be made available to any third parties. | <input type="checkbox"/> |
| 6. I know how to contact the research team if I need to. | <input type="checkbox"/> |
| 7. I agree with my child's participation in all aspects of this research. | <input type="checkbox"/> |

Name _____ **Date** _____

Investigator's Statement:

I _____ confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed

Date

Participant Consent Form for Study 2

Research Project: The role of personality in adolescents' risky behaviour

To participate in this research, read this form. To consent to each aspect of the research, please tick the boxes below. If you wish to opt out of a particular aspect of the research please let us know.

1. I have read and understood the information sheet on the above project and have been given a copy to keep. ☐
2. I have had the opportunity to ask questions about the project, these have been answered satisfactorily. ☐
3. I received enough information about the studies and understand why the research is being done. ☐
4. I understand that I have the right to withdraw my participation at any time without giving a reason. ☐
5. I understand that the information that I give is anonymous and confidential and will not be made available to any third parties. ☐
6. I know how to contact the research team if I need to. ☐
7. I agree to participate in this research. ☐

"This study has been explained to me to my satisfaction, and I agree to take part. I understand that I am free to withdraw at any time."

Name _____ **Date** _____

Investigator's Statement:

I _____ confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed

Date

Debrief form for Study 2

TITLE: The role of personality in adolescents' risky behaviour

Thank you very much for taking part in this study. If you have any further questions about the study please contact us. The following information will tell you a little bit more about the study.

The study is looking at personality traits that may be linked to problem behaviours in a healthy group of adolescents. It has been found that such behaviours may help to predict problem behaviours such as aggression or alcohol misuse later on in adulthood. For example, individuals who are impulsive as adolescents may be likely to drink more alcohol as adults than individuals who are less impulsive.

We appreciate your help with this study.

Debrief form for Study 3

Thank you very much for taking part in this study.

The study is looking at personality traits that may be linked to problem behaviours in typically developing healthy individuals. There is some evidence that insecure attachment styles are associated with problem behaviours such as antisocial tendencies. We are trying to shed more light into this area of research.

If you have any further questions about the study please contact us.

We are aware that some of the questions asked were sensitive in nature. We have included a list of help-lines that may be useful to you if at some point you feel upset as a result of what was covered today and you would like to speak to someone:

Cripps Health Centre (University of Nottingham/students' and staff health centre): 0115 950 1654

Nightline (University of Nottingham): offers support, practical advice and information to anyone concerned about mental distress as well as practical information. Tel: 0115 951 4985
<http://www.su.nottingham.ac.uk/organisation/NottinghamNightline/> Open daily 7pm – 8am.

University of Nottingham Counselling Service: 0115 951 3695

Samaritans: offers free emotional support to anyone going through a crisis. 08457 90 90 90 - 24 hours a day, 7 days a week, www.samaritans.org.uk, email: jo@samaritans.org

We appreciate your help with this study.

Kathleen Baess, PhD Student

lpkbb1@nottingham.ac.uk

APPENDIX 3.2 YOUTH PSYCHOPATHY INVENTORY (YPI)

Instructions

This sheet consists of a number of statements that deal with what you think and feel about different things. Read each statement carefully and decide how well the particular statement applies to you. You can choose between four different alternatives on each statement.

Answer each statement as you most often feel and think, not only how you feel right now.

Example: I like reading books.

Does not apply at all Does not apply well Applies fairly well Applies very well

Put a mark in the box that corresponds to how you feel. Do not think too long on each statement.

REMEMBER: Answer ALL statements. Do not put a mark between the alternatives. Only one answer per statement.

IMPORTANT!!! There are no answers that are "Right" or "Wrong". You cannot score worse or better than anyone else. We are interested in what you think and feel, not in what is "Right" or "Wrong".

Answers: Does not apply at all Does not apply well Applies fairly well Applies very well

1. I like to be where exciting things happen.
2. I usually feel calm when other people are scared.
3. I prefer to spend my money right away rather than save it.
4. I get bored quickly when there is too little change.
5. I have probably skipped school or work more than most other people.
6. It's easy for me to charm and seduce others to get what I want from them.
7. It's fun to make up stories and try to get people to believe them.
8. I have the ability not to feel guilt and regret about things that I think other people would feel guilty about.
9. I consider myself as a pretty impulsive person.
10. I'm better than everyone on almost everything.
11. I can make people believe almost anything.
12. I think that crying is a sign of weakness, even if no one sees you.
13. If I won a lot of money in the lottery I would quit school or work and just do things that are fun.
14. I have the ability to con people by using my charm and smile.
15. I am good at getting people to believe in me when I make something up.
16. I have often been late to work or classes in school.
17. When other people have problems, it is often their own fault, therefore, one should not help them.
18. It often happens that I talk first and think later.
19. I have talents that go far beyond other people's.

20. It's easy for me to manipulate people.
21. I seldom regret things I do, even if other people feel that they are wrong.
22. I like to do things just for the thrill of it.
23. It's important to me not to hurt other people's feelings.
24. Sometimes I lie for no reason, other than because it's fun.
25. To be nervous and worried is a sign of weakness.
26. If I get the chance to do something fun, I do it no matter what I had been doing before.
27. When someone asks me something, I usually have a quick answer that sounds believable, even if I've just made it up.
28. When someone finds out about something that I've done wrong, I feel more angry than guilty.
29. I get bored quickly by doing the same thing over and over.
30. The world would be a better place if I were in charge.
31. To get people to do what I want, I often find it efficient to con them.
32. It often happens that I do things without thinking ahead.
33. Pretty often I act charming and nice, even with people I don't like, in order to get what I want.
34. It has happened several times that I've borrowed something and then lost it.
35. I often become sad or moved by watching sad things on TV or film.
36. What scares others usually doesn't scare me.
37. I'm more important and valuable than other people.
38. When I need to, I use my smile and my charm to use others.
39. I don't understand how people can be touched enough to cry by looking at things on TV or movie.
40. I often don't/didn't have my school or work assignments done on time.
41. I am destined to become a well-known, important and influential person.
42. I like to do exciting and dangerous things, even if it is forbidden or illegal.
43. Sometimes I find myself lying without any particular reason.
44. To feel guilty and remorseful about things you have done that have hurt other people is a sign of weakness.
45. I don't let my feelings affect me as much as other people's feelings seem to affect them.
46. It has happened that I've taken advantage of (used) someone in order to get what I want.
47. I like to spice up and exaggerate when I tell about something.
48. To feel guilt and regret when you have done something wrong is a waste of time.
49. I usually become sad when I see other people crying or being sad.
50. I've often gotten into trouble because I've lied too much.

APPENDIX 3.3 REACTIVE PROACTIVE AGGRESSION QUESTIONNAIRE

(RPQ)

Instructions

There are times when most of us feel angry, or have done things we should not have done. Rate each of the items below by putting a circle around 0 (never), 1 (sometimes), or 2 (often). Do not spend a lot of time thinking about the items—just give your first response. Make sure you answer all the items (see below).

How often have you...

- | | |
|---|-------|
| 1. Yelled at others when they have annoyed you | 0 1 2 |
| 2. Had fights with others to show who was on top | 0 1 2 |
| 3. Reacted angrily when provoked by others | 0 1 2 |
| 4. Taken things from other students | 0 1 2 |
| 5. Gotten angry when frustrated | 0 1 2 |
| 6. Vandalized something for fun | 0 1 2 |
| 7. Had temper tantrums | 0 1 2 |
| 8. Damaged things because you felt mad | 0 1 2 |
| 9. Had a gang fight to be cool | 0 1 2 |
| 10. Hurt others to win a game | 0 1 2 |
| 11. Become angry or mad when you don't get your way | 0 1 2 |
| 12. Used physical force to get others to do what you want | 0 1 2 |
| 13. Gotten angry or mad when you lost a game | 0 1 2 |
| 14. Gotten angry when others threatened you | 0 1 2 |
| 15. Used force to obtain money or things from others | 0 1 2 |
| 16. Felt better after hitting or yelling at someone | 0 1 2 |
| 17. Threatened and bullied someone | 0 1 2 |
| 18. Made obscene phone calls for fun | 0 1 2 |
| 19. Hit others to defend yourself | 0 1 2 |
| 20. Gotten others to gang up on someone else | 0 1 2 |
| 21. Carried a weapon to use in a fight | 0 1 2 |
| 22. Gotten angry or mad or hit others when teased | 0 1 2 |

23. Yelled at others so they would do things for you 0 1 2

APPENDIX 3.5 ALCOHOL USE QUESTIONNAIRE REVISED (AUQ)

Please consider your drinking behaviour in the last 6 months.

1. How many glasses of wine, or any wine-type product, eg. sherry, port, martini, do you have in a month, in total? _____
2. How many pints of beer/cider do you drink in a month, in total? _____
3. How many drinks of spirits do you have in a month, in total? _____
4. How many bottles of alcopop do you have each month, in total? _____
5. When you drink, how fast do you drink? (Here, a drink is a glass of wine, a pint of beer, a shot of spirits, straight or mixed). Please circle the correct response.
Drinks per hour: 7+, 6, 5, 4, 3, 2, 1, 1 drink in 2 hours, 1 drink in 3 or more hours
6. How many times have you been drunk in the last 6 months? By 'drunk' we mean loss of co-ordination, nausea, and/or inability to speak clearly _____
7. What percentage of times that you drink do you get drunk? _____
8. At what age did you start drinking alcohol? _____
9. How often have you continued drinking alcohol despite experiencing negative consequences?

never	rarely	occasionally	often	Almost always
1	2	3	4	5

APPENDIX 3.4 AUDIT REVISED

FOR EACH QUESTION SELECT YOUR ANSWER AND USE THE NUMBER GIVEN IN BRACKETS [] TO FILL IN THE BOX

One unit of alcohol is: ½ pint average strength beer/lager OR one glass of wine OR one single measure of spirits. Note: a can of high strength beer or lager may contain 3-4 units.

1. How often do you have a drink containing alcohol?

[0] Never [1] Monthly or less [2] 2-4 times a month

[3] 2-3 times a week [4] 4 or more times a week

2. How many units of alcohol do you drink on a typical day when you are drinking?

[0] 1 or 2 (for example up to 1 pint of beer/ up to 2 glasses of wine/up to 2 alcopops)

[1] 3 or 4 (up to 2 pints of beer/ 4 glasses of wine/ 4 alcopops)

[2] 5 or 6 (up to 3 pints of beer/ 6 glasses of wine/ 6 alcopops)

[3] 7, 8 or 9 (up to 4 ½ pints of beer/ 9 glasses of wine/ 9 alcopops)

[4] 10 or more (more than 5 pints of beer/ 10 glasses of wine/ 10 alcopops)

3. How often do you have six or more units of alcohol on one occasion?

[0] Never [1] Less than monthly [2] Monthly [3] Weekly [4] Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?

[0] Never [1] Less than monthly [2] Monthly

[3] Weekly [4] Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

[0] Never [1] Less than monthly [2] Monthly [3] Weekly [4] Daily or almost daily

6. How often during the last year have you had a feeling of guilt or remorse after drinking?

[0] Never [1] Less than monthly [2] Monthly

[3] Weekly [4] Daily or almost daily

7. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

[0] Never [1] Less than monthly [2] Monthly [3] Weekly [4] Daily or almost daily

8. Have you or someone else been injured as a result of your drinking?

[0] No [2] Yes but not in the last year [4] Yes, during the last year

9. Has a relative or friend or doctor or another health worker been concerned about your drinking or suggested you cut down?

[0] No [2] Yes but not in the last year [4] Yes, during the last year

APPENDIX 3.5 IPIP50 - BIG-FIVE FACTOR MARKERS

Factor I (Surgency or Extraversion)

- 10-item scale**
- + keyed
- 1 Am the life of the party.
 - 2 Feel comfortable around people.
 - 3 Start conversations.
 - 4 Talk to a lot of different people at parties.
 - 5 Don't mind being the center of attention.
- keyed
- 6 Don't talk a lot.
 - 7 Keep in the background.
 - 8 Have little to say.
 - 9 Don't like to draw attention to myself.
 - 10 Am quiet around strangers.

Factor II (Agreeableness)

- 10-item scale**
- + keyed
- 11 Am interested in people.
 - 12 Sympathize with others' feelings.
 - 13 Have a soft heart.
 - 14 Take time out for others.
 - 15 Feel others' emotions.
 - 16 Make people feel at ease.
- keyed
- 17 Am not really interested in others.
 - 18 Insult people.
 - 19 Am not interested in other people's problems.
 - 20 Feel little concern for others.

Factor III (Conscientiousness)

- 10-item scale**
- + keyed
- 21 Am always prepared.
 - 22 Pay attention to details.
 - 23 Get chores done right away.
 - 24 Like order.
 - 25 Follow a schedule.
 - 26 Am exacting in my work.
- keyed
- 27 Leave my belongings around.
 - 28 Make a mess of things.

- 29 Often forget to put things back in their proper place.
 30 Shirk my duties.

Factor IV (Emotional Stability)

- 10-item scale*
- + keyed 31 Am relaxed most of the time.
 32 Seldom feel blue.
- keyed 33 Get stressed out easily.
 34 Worry about things.
 35 Am easily disturbed.
 36 Get upset easily.
 37 Change my mood a lot.
 38 Have frequent mood swings.
 39 Get irritated easily.
 40 Often feel blue.

Factor V (Intellect or Imagination)

- 10-item scale*
- + keyed 41 Have a rich vocabulary.
 42 Have a vivid imagination.
 43 Have excellent ideas.
 44 Am quick to understand things.
 45 Use difficult words.
 46 Spend time reflecting on things.
 47 Am full of ideas.
- keyed 48 Have difficulty understanding abstract ideas.
 49 Am not interested in abstract ideas.
 50 Do not have a good imagination.

APPENDIX 4.1 INFORMATION SHEET CONSENT AND DEBRIEF FORM FOR STUDY 4

Information Sheet

Research Project: The association between personality traits and attachment

Researcher: Kathleen Baess (lpxeb1@nottingham.ac.uk)

Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Dear Student,

We would like to invite you to take part in a study about personality and attachment conducted in the School of Psychology at the University of Nottingham. This study has been approved by the ethics committee of the School of Psychology.

Why is this research conducted?

The study's aim is to look at differences in personality, antisocial tendencies and how these relate to attachment. If a link between certain personality traits and attachment styles is found this could help us to clarify which potential factors are related to antisocial tendencies and how they affect behaviour.

What does the study involve?

There will be four questionnaires for you to answer. The questionnaires will look at personality and your relationship with your family. Completing the online questionnaires will take approximately 15 minutes.

For taking part in this study you will be entered into a prize-draw if you wish and you can win £25 at the end of the study.

How will the data be used?

The data you provide is completely anonymous, which means that it is collected and stored without any identifying information (such as names or date of births). The data will be kept confidential and will not be shared with others. You should be aware that since this research is conducted online, there is always a risk of intrusion by outside agents, for example through hacking, and therefore the possibility of being identified. However, we do everything to ensure that this does not happen by keeping your data in an encrypted format on a secure server and we ensure that the data is kept and stored separately from any personal information.

What needs to be done?

If you are willing to take part, please sign the consent form by clicking the 'next' button at the bottom of this page.

If at any time you decide that you do not want to continue, you are free to withdraw without giving any reason. This is completely voluntary. If you have any questions about this study please contact the researchers. They will be happy to answer any questions or concerns you may have.

Yours sincerely,

Kathleen Baess, PhD Student

Email: lpxeb1@nottingham.ac.uk

Supervisor

Dr Claire Lawrence

Email: claire.lawrence@nottingham.ac.uk

Participant Consent Form for Study 4

Research Project: The association between personality traits and attachment

To participate in this research, please read this form. To consent to each aspect of the research, please tick the boxes below. If you wish to opt out of a particular aspect of the research please let us know.

- | | |
|---|--------------------------|
| 1. I have read and understood the information sheet on the above project. | <input type="checkbox"/> |
| 2. I have had the opportunity to ask questions about the project, these have been answered satisfactorily. | <input type="checkbox"/> |
| 3. I received enough information about the studies and understand why the research is being done. | <input type="checkbox"/> |
| 4. I understand that I have the right to withdraw my participation at any time without giving a reason. | <input type="checkbox"/> |
| 5. I understand that the information that I give is anonymous and confidential and will not be made available to any third parties. | <input type="checkbox"/> |
| 6. I know how to contact the research team if I need to. | <input type="checkbox"/> |
| 7. I agree to participate in this research. | <input type="checkbox"/> |

Investigator's Statement:

I _____ confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed

Date

Debrief form for Study 4

Thank you very much for taking part in this study.

The study is looking at personality traits that may be linked to problem behaviours in typically developing healthy individuals. There is some evidence that insecure attachment styles are associated with problem behaviours such as antisocial tendencies. We are trying to shed more light into this area of research.

If you have any further questions about the study please contact us.

We are aware that some of the questions asked were sensitive in nature. We have included a list of help-lines that may be useful to you if at some point you feel upset as a result of what was covered today and you would like to speak to someone:

Cripps Health Centre (University of Nottingham/students' and staff health centre): 0115 950 1654

Nightline (University of Nottingham): offers support, practical advice and information to anyone concerned about mental distress as well as practical information. Tel: 0115 951 4985
<http://www.su.nottingham.ac.uk/organisation/NottinghamNightline/> Open daily 7pm – 8am.

University of Nottingham Counselling Service: 0115 951 3695

Samaritans: offers free emotional support to anyone going through a crisis. 08457 90 90 90 - 24 hours a day, 7 days a week, www.samaritans.org.uk, email: jo@samaritans.org

We appreciate your help with this study.

Kathleen Baess, PhD Student
lpxkb1@nottingham.ac.uk

APPENDIX 4.2. INVENTORY OF PARENT AND PEER ATTACHMENT

REVISED (IPPAR)

This questionnaire asks about your relationships with your parents and friends. Please read the directions to each part carefully.

Part I (Part II for fathers is the same)

Some of the following statements ask about your feelings about your mother or the person who has acted as your mother. If you have more than one person acting as your mother (e.g. a natural mother and a step-mother) answer the questions for the one you feel has most influenced you.

Please read each statement and tick the ONE number that tells how true the statement is for you now.

1. My mother respects my feeling.
2. I feel my mother does a good job as my mother.
3. I wish I had a different mother.
4. My mother accepts me as I am.
5. I like to get my mother's point of view on things I'm concerned about.
6. I feel it's no use letting my feelings show around my mother.
7. My mother can tell when I'm upset about something.
8. Talking over my problems with my mother makes me feel ashamed or foolish.
9. My mother expects too much from me.
10. I get upset easily around my mother.
11. I get upset a lot more than my mother knows about.
12. When we discuss things, my mother cares about my point of view.
13. My mother trusts my judgment.
14. My mother has her own problems, so I don't bother her with mine.
15. My mother helps me to understand myself better.
16. I tell my mother about my problems and troubles.
17. I feel angry with my mother.
18. I don't get much attention from my mother.
19. My mother helps me to talk about my difficulties.
20. My mother understands me.
21. When I am angry about something, my mother tries to be understanding.
22. I trust my mother.
23. My mother doesn't understand what I'm going through these days.
24. I can count on my mother when I need to get something off my chest.
25. If my mother knows something is bothering me, she asks me about it.

APPENDIX 4.3. RELATIONSHIP QUESTIONNAIRE (RQ)

Scale:

Following are four general relationship styles that people often report. Place a checkmark next to the letter corresponding to the style that best describes you or is closest to the way you are.

____ A. It is easy for me to become emotionally close to others. I am comfortable depending on them and having them depend on me. I don't worry about being alone or having others not accept me.

____ B. I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

____ C. I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

____ D. I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Now please rate each of the relationship styles above to indicate how well or poorly each description corresponds to your general relationship style.

			Style A			
1	2	3	4	5	6	7
Disagree Strongly			Neutral/ Mixed		Agree Strongly	
			Style B			
1	2	3	4	5	6	7
			Style C			
1	2	3	4	5	6	7
			Style D			
1	2	3	4	5	6	7

APPENDIX 5.1 INFORMATION SHEET FOR PRE-SCREENING, EXPERIMENT, CONSENT
FORM AND DEBRIEF FORM FOR STUDY 5

Information Sheet

Research Project: Individual differences and personality

Researcher: Kathleen Baess (lpxeb1@nottingham.ac.uk)

Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Dear Student,

We would like to invite you to take part in a short online survey about personality and individual differences conducted within the School of Psychology, University of Nottingham.

This survey has been approved by the ethics committee of the School of Psychology.

The questionnaires look at differences in personality traits. Completing them will only take five minutes.

For taking part in this survey you will be entered into a prize-draw if you wish and you can win one of three £10 vouchers at the end of the study.

If you are interested in taking part in an exciting experimental study as well, you can give us your contact details at the end of the survey and we may invite you in for some interesting tasks involving eye tracking.

The data you provide will be kept confidential and will not be shared with others. You should be aware that since this research is conducted online, there is always a risk of intrusion by outside agents, for example through hacking, and therefore the possibility of being

identified. However, we do everything to ensure that this does not happen by keeping your data in an encrypted format on a secure server and we ensure that the data is kept and stored separately from any personal information.

If you are willing to take part, please sign the consent form by clicking the 'next' button at the bottom of this page.

If at any time you decide that you do not want to continue, you are free to withdraw without giving any reason. This is completely voluntary. If you have any questions about this study please contact the researchers. They will be happy to answer any questions or concerns you may have.

Yours sincerely,

Kathleen Baess, PhD Student
School of Psychology
Email: lpxeb1@nottingham.ac.uk

Supervisor

Dr Claire Lawrence
School of Psychology
Email: claire.lawrence@nottingham.ac.uk

Information Sheet for Study 5

Research Project: Individual differences in emotion processing and attachment

Researcher: Kathleen Baess (lpxkb1@nottingham.ac.uk)

Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Dear Student,

We would like to invite you to take part in this study about personality and attachment. This study has been approved by the ethics committee of the School of Psychology.

The aim of this study is to look at differences in personality traits and how these relate to attachment and emotion processing in typically developing healthy individuals.

There will be a few questionnaires for you to answer about different aspects of personality and your experiences in close relationships. Please be aware that these questionnaires are in no way diagnostic tests and feedback cannot be given.

In the experimental task you will be presented with images of faces and your task is to identify the facial expressions displayed by pressing the corresponding key on the keyboard. Your eye-movements will simultaneously be recorded via an eye-tracking device. I will fit this device on your head before the task begins.

You will be entered into a prize-draw if you wish and you can win a £30 voucher at the end of the study.

The data you provide will be collected and stored separately from any personal information that may identify you (such as names or date of births). Also the data will be kept confidential and will not be shared with others.

If you are willing to take part, please sign the consent form. If, at any time, you decide that you do not want to continue, you are free to withdraw without giving any reason. This study is completely voluntary.

If you have any questions about this study please do not hesitate to ask. We are happy to answer any questions or concerns you may have.

Yours sincerely,

Kathleen Baess, PhD Student

Email: lpxeb1@nottingham.ac.uk

Supervisor

Dr Claire Lawrence

Email: claire.lawrence@nottingham.ac.uk

Information Sheet for Study 5

Research Project: Decision making and individual differences

Researcher: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Dear Student,

We would like to invite you to take part in this study about personality and decision making.

This study has been approved by the ethics committee of the School of Psychology.

We would like to investigate how different people respond in a decision making task that involves money.

Your task will be to allocate money between yourself and a charity. The data will be kept confidential and will not be shared with others. All collected data will be stored separately from any personal information that may identify you (i.e. name, date of birth).

If you are willing to take part, please sign the consent form. If, at any time, you decide that you do not want to continue, you are free to withdraw without giving any reason. This study is completely voluntary.

If you have any questions about this study please do not hesitate to ask. We are happy to answer any questions or concerns you may have.

Yours sincerely,

Dr Claire Lawrence

Email: claire.lawrence@nottingham.ac.uk

Participant Consent Form (same for Phase 1 and 2) in study 5

Participant Consent Form

Research Project: Individual differences in emotion processing and attachment

To participate in this research, please read this form. To consent to each aspect of the research, please tick the boxes below. If you wish to opt out of a particular aspect of the research please let us know.

- | | |
|---|--------------------------|
| 1. I have read and understood the information sheet on the above project. | <input type="checkbox"/> |
| 2. I have had the opportunity to ask questions about the project, these have been answered satisfactorily. | <input type="checkbox"/> |
| 3. I received enough information about the studies and understand why the research is being done. | <input type="checkbox"/> |
| 4. I understand that I have the right to withdraw my participation at any time without giving a reason. | <input type="checkbox"/> |
| 5. I understand that the information that I give is anonymous and confidential and will not be made available to any third parties. | <input type="checkbox"/> |
| 6. I know how to contact the research team if I need to. | <input type="checkbox"/> |
| 7. I agree to participate in this research. | <input type="checkbox"/> |

Name (print): _____ **Signature:** _____

Investigator's Statement:

I _____ confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed

Date

Debrief form for Phase 1 in study 5

Thank you very much for taking part in this survey. If you would like to take part in an exciting behavioural study which will include experimental tasks and a chance to win £30, please enter your email address below.

Email: _____

The current survey looks at a variety of personality traits that may be linked to risky behaviours in typically developing healthy individuals and whether this is linked to specific developmental factors.

If you have any further questions about the study please contact us.

We appreciate your help with this study.

Kathleen Baess, PhD Student

lpxkb1@nottingham.ac.uk

Debrief form for Phase 1 in study 5

Thank you very much for taking part in this study.

The study is looking at personality traits that may be linked to risky subclinical behaviours (such as antisocial tendencies) in typically developing healthy individuals. However, the questionnaires you filled in are not diagnostic tools.

We asked you to take part in a charity donation study. This study was, in fact, connected to the first part of the study – as we are looking to see whether emotional processing of face expressions and personality influence the way people feel empathy and give money to charities. Such emotional processing may be related to attachment and we are looking to find a link of attachment with personality and empathy.

The charity we described does not actually exist. However, ALL the money donated will be given to a charity which does exactly the sort of work described to you in the task. The money will all be donated to UNIFEC.

If you have any further questions about the study please contact us.

We are aware that some of the questions asked were sensitive in nature. We have included a list of help-lines that may be useful to you if at some point you feel upset as a result of what was covered today and you would like to speak to someone:

Cripps Health Centre (UoN/students' and staff health centre): 0115 950 1654

Nightline (University of Nottingham): offers support, practical advice and information to anyone concerned about mental distress as well as practical information. Tel: 0115 951 4985

<http://www.su.nottingham.ac.uk/organisation/NottinghamNightline/> Open daily 7pm – 8am.

University of Nottingham Counseling Service: 0115 951 3695

Samaritans: offers free emotional support to anyone going through a crisis.

Tel: 08457 90 90 90 - 24 hours a day, 7 days a week, www.samaritans.org.uk

Email: jo@samaritans.org

We appreciate your help with this study.

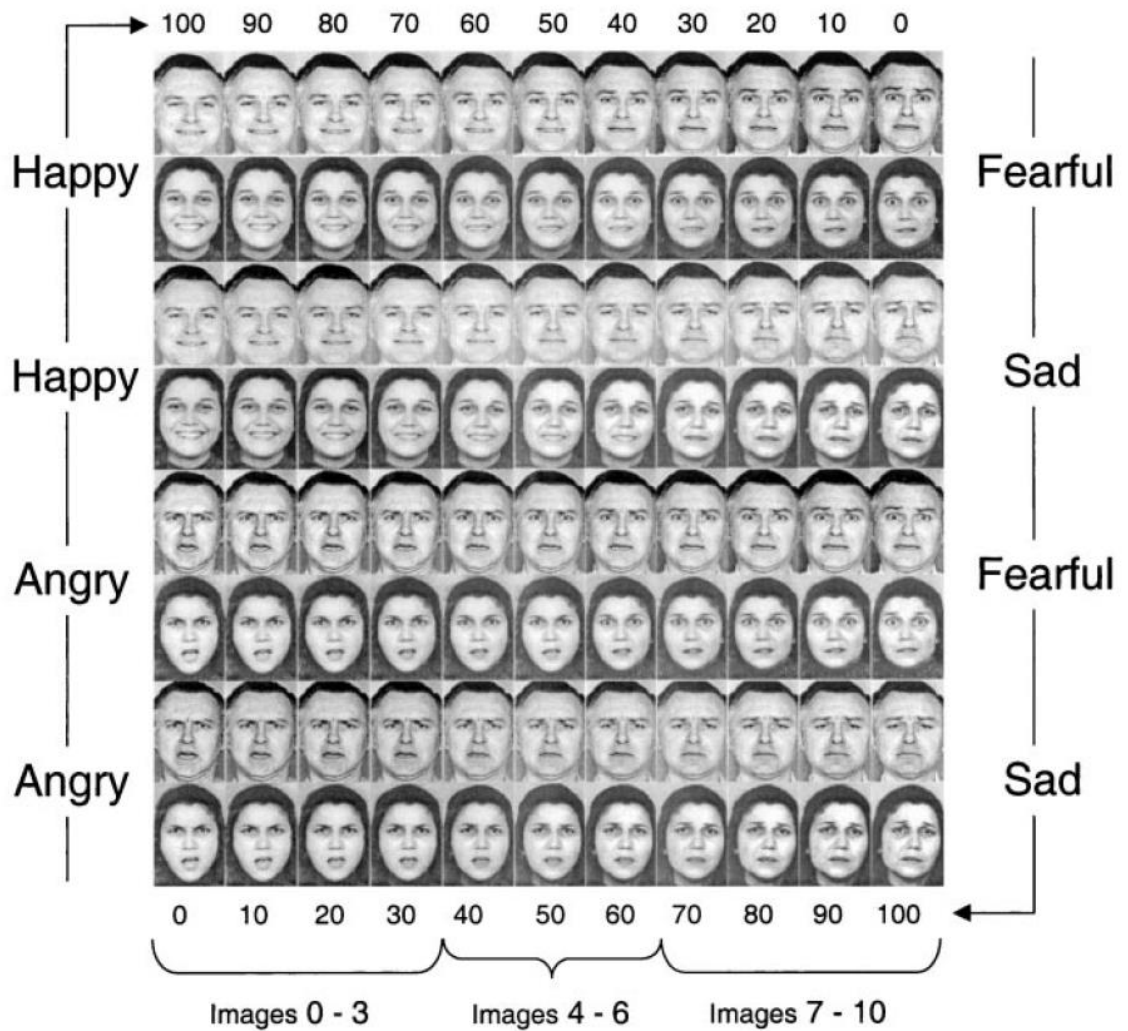
Kathleen Baess, PhD Student (lpxkb1@nottingham.ac.uk)

APPENDIX 5.2 AUTISM QUOTIENT 10 (AQ10)

Definitely Agree – Slightly Agree – Slightly Disagree – Definitely Disagree

1. I often notice small sounds when others do not.
2. I usually concentrate more on the whole picture, rather than the small details.
3. I find it easy to do more than one thing at once.
4. If there is an interruption, I can switch back to what I was doing very quickly.
5. I find it easy to “read between the lines” when someone is talking to me.
6. I know how to tell if someone listening to me is getting bored.
7. When I’m reading a story I find it difficult to work out the characters’ intentions.
8. I like to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plants, etc.)
9. I find it easy to work out what someone is thinking or feeling just by looking at their face.
10. I find it difficult to work out people’s intentions.

Appendix 5.3 Morphed face stimuli in four conditions, taken from Pollak
et al. (2002)



APPENDIX 6.1 INFORMATION SHEET, CONSENT AND DEBRIEF FORM FOR STUDY 6

Information Sheet

Research Project: Individual differences in emotion processing and attachment

Researcher: Kathleen Baess (lpxkb1@nottingham.ac.uk)

Supervisor: Dr Claire Lawrence (claire.lawrence@nottingham.ac.uk)

Dear Student,

We would like to invite you to take part in this study about personality and attachment. This study has been approved by the ethics committee of the School of Psychology.

The aim of this study is to look at differences in personality traits and how these relate to attachment and emotion processing in typically developing healthy individuals.

There will be a few questionnaires for you to answer about different aspects of personality, **alcohol use** and your experiences in relationships. Please be aware that these questionnaires are in no way diagnostic tests and feedback cannot be given.

In the experimental task you will be presented with images of faces and your task is to identify the facial expressions displayed by pressing the corresponding key on the keyboard.

The whole study will take approx. 40 min. For taking part you will receive an inconvenience allowance of £5.

There will also be an unrelated second task that is part of a different project. This task will only take 3 minutes and will look at decision making and how it is linked to personality traits.

The data you provide will be collected and stored separately from any personal information that may identify you (such as names or date of births). Also the data will be kept confidential and will not be shared with others.

If you are willing to take part, please sign the consent form. If, at any time, you decide that you do not want to continue, you are free to withdraw without giving any reason. This study is completely voluntary.

If you have any questions about this study please do not hesitate to ask. We are happy to answer any questions or concerns you may have.

Yours sincerely,

Kathleen Baess, PhD Student

Email: lpxkb1@nottingham.ac.uk

Supervisor

Dr Claire Lawrence

Email: claire.lawrence@nottingham.ac.uk

Participant Consent Form

Participant Consent Form for Study 6

Research Project: Individual differences in emotion processing and attachment

To participate in this research, please read this form. To consent to each aspect of the research, please tick the boxes below. If you wish to opt out of a particular aspect of the research please let us know.

- | | |
|---|--------------------------|
| 1. I have read and understood the information sheet on the above project. | <input type="checkbox"/> |
| 2. I have had the opportunity to ask questions about the project, these have been answered satisfactorily. | <input type="checkbox"/> |
| 3. I received enough information about the studies and understand why the research is being done. | <input type="checkbox"/> |
| 4. I understand that I have the right to withdraw my participation at any time without giving a reason. | <input type="checkbox"/> |
| 5. I understand that the information that I give is anonymous and confidential and will not be made available to any third parties. | <input type="checkbox"/> |
| 6. I know how to contact the research team if I need to. | <input type="checkbox"/> |
| 7. I agree to participate in this research. | <input type="checkbox"/> |

Name (print): _____

Signature:

Investigator's Statement:

I _____ confirm that I have carefully explained the nature, demands and any foreseeable risks (where applicable) of the proposed research to the volunteer.

Signed

Date

Debrief Form for Study 6

Thank you very much for taking part in this study. The study is looking at personality traits that may be linked to risky subclinical behaviours (such as antisocial tendencies) in typically developing healthy individuals. However, the questionnaires you filled in are not diagnostic tools.

We asked you to take part in a decision making task about money. This task was, in fact, connected to the first part of the study – as we are looking to see whether emotional processing of face expressions and personality influence the way people chose to play in economic games (removing some money from another individual playing the same game). Such emotional processing may be related to attachment and we are looking to find a link of attachment with personality and behaviour in such economic games. If you have any further questions about the study please contact us.

We are aware that some of the questions asked were sensitive in nature. We have included a list of help-lines that may be useful to you if at some point you feel upset as a result of what was covered today and you would like to speak to someone:

Cripps Health Centre (UoN/students' and staff health centre): 0115 950 1654

Nightline (University of Nottingham): offers support, practical advice and information to anyone concerned about mental distress and practical information. Tel: 0115 951 4985

<http://www.su.nottingham.ac.uk/organisation/NottinghamNightline/> Open daily 7pm – 8am.

University of Nottingham Counseling Service: 0115 951 3695

Samaritans: offers free emotional support to anyone going through a crisis. Tel: 08457 90 90 90 - 24 hours a day, 7 days a week, www.samaritans.org.uk, Email: jo@samaritans.org

We appreciate your help with this study.

Kathleen Baess

Email: lpkbb1@nottingham.ac.uk

Tel: 0115 8468657

APPENDIX 6.2 MINI-JOD INSTRUCTIONS

Thank you for participating in this experiment. The experiment will last approximately 3 minutes. If you read the following instructions carefully, you can, depending on your own decisions, earn an additional amount of money. It is therefore very important that you read these instructions with care.

These instructions are solely for your private use. It is not allowed to communicate with the other participants during the experiments. Should you have any questions, please ask the experimenter. If you violate this rule, you will be excluded from this experiment and you will forfeit any earnings from this experiment.

You will be paid after the experiment. No other participant will know how much you earned.

During the experiment you will have the chance to earn 'Guilder', which will be converted into cash at the end of today's session, using an exchange rate of 1 Guilder = £0.20.

In the experiment you are randomly matched with another participant – this participant will be your partner. You will not learn the identity of the participant you are matched with, and vice versa your partner will never learn about your identity.

You and your partner both receive an endowment of 10 Guilder. You then have to decide whether to reduce your partner's income or to leave it as it is. Reducing your partner's income will cost you 1 Guilder. By paying 1 Guilder, you can reduce your partner's income by 2 Guilder, 3 Guilder or 4 Guilder. Your partner simultaneously takes the same decision. S/he can choose between leaving your income unaltered or reducing it by 2 Guilder, 3 Guilder or 4 Guilder. Your partner will incur the same cost - 1 Guilder - if s/he chooses to reduce your income.

The table below shows you what actions can occur in the game and what the resulting earnings for you will be.

Your action	Partner's action	resulting pay
Nothing	Nothing	10 Guilder
Burn partner's (any amount)	Nothing	9 Guilder
Burn partner's (any amount)	Burns 2 of your Guilder	7 Guilder (=10-1-2)
Burn partner's (any amount)	Burns 3 of your Guilder	6 Guilder (= 10-1-3)
Burn partner's (any amount)	Burns 4 of your Guilder	5 Guilder (=10-1-4)
Nothing	Burns 2 of your Guilder	8 Guilder (=10-2)
Nothing	Burns 3 of your Guilder	7 Guilder (=10-3)
Nothing	Burns 4 of your Guilder	6 Guilder (=10-4)

After you and your partner have decided whether or not to reduce the other person's income, a throw of a die makes the final decision whether your or your partners' income will be reduced. The die will be thrown **twice**, once for you and another time for your partner.

If the die shows 1 or 6, your income or the income of your partner (depending for whom the die has been thrown) will be reduced, **by an amount independent of your or your partners' decision**. If the die shows any other number (2,3,4,5) **then yours or your partner's decision will be realized**: If you or your partner has decided to reduce the other person's income – the income will be reduced. If you or your partner has decided not to reduce the other person's income – the income will not be reduced. Please be aware that neither you nor your partner will learn about the outcome of the die roll.

Therefore, if your income or your partner's income will be reduced by any amount, you will never learn what the reason for this reduction has been: the decision of the partner or the results of the

throw of the die. Similarly, your partner will never know if their income has been reduced whether this is because of the roll of the die or your decision.

Please make your decision now:

Your endowment in this experiment is 10 Guilder.

Do you want to pay 1 Guilder to reduce your partner's income?

YES	
NO	

If you choose "YES", you will incur costs of 1 Guilder, and your partner's income will be reduced. Please choose the amount by which your partner's income will be reduced.

2 Guilder	3 Guilder	4 Guilder

Your partner simultaneously takes the same decision. Please think about your decision carefully.

We now ask you to estimate whether you think that your partner decided to reduce your income at the cost of 1 Guilder.

If your expectation is correct you will earn another Guilder.

My estimate is that

My partner will NOT reduce my income	
My partner will reduce my income	

After you have made your decision, we ask you to remain seated. You will receive a number of questionnaires, which we also ask you to please complete. Meanwhile, we will – one by one - pay each participant their total earnings in cash.